



paradigm
TRANSPORTATION SOLUTIONS LIMITED



Transportation Brief 80 Marion Street, Mount Hope, ON

Paradigm Transportation Solutions Limited

January 2018



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3 January 2018
Project: 170310

Andrew Eldebs
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**RE: 80 MARION STREET, MOUNT HOPE
TRANSPORTATION BRIEF**

Paradigm Transportation Solutions Limited (Paradigm) has prepared this Transportation Brief for the proposed development at 80 Marion Street in Mount Hope, Ontario. Development plans entail the construction of 117 residential units with access provided through an extension of Marion Street.

Pre-study consultation with the City of Hamilton in November 2017, produced the terms of reference for this study. **Appendix A** contains correspondence regarding this process.

The scope of work for this evaluation is generally limited to the local roadway network and includes the intersections of Marion Street with Airport Road and Strathearne Place as well as Homestead Drive at Strathearne Place. This letter includes the following:

- ▶ Description of the existing roadway network in the vicinity of the site;
- ▶ Description of the proposed development program;
- ▶ Trip generation estimates for the proposed development program;
- ▶ Description of the traffic volume network development;
- ▶ Evaluation of traffic operations within the study area;
- ▶ Requirements for traffic calming measures on Marion Street; and
- ▶ Conclusions and recommendations to support the project.

Existing Conditions

The development is located at the southwest corner of Spitfire Drive and Marion Street in the community of Mount Hope, Ontario. The location of the development in relation to the local roadway network is illustrated in **Figure 1 (Enclosed)**.

Roadway Description

- ▶ **Airport Road** is a paved two-lane roadway running east-west within the study area. Airport Road has an urban cross-section with one travel lane in each direction and a posted speed limit of 50 kilometres per hour. A continuous paved sidewalk is provided on the north side of Airport Road.
- ▶ **Homestead Drive** is a paved two-lane road running north-south within the study area. Homestead Drive connects directly to Upper James Street, however inbound right turn movements are permitted at the northerly connection and outbound right turn movements are permitted at the southerly connection. Homestead Drive has an urban cross-section with one through lane in each direction and an assumed speed limit of 50 kilometres per hour. There is a continuous paved sidewalk on the west side of Homestead Drive.
- ▶ **Marion Street** is a paved two-lane road running north-south within the study area. Marion Street has an urban cross-section and an assumed speed limit of 50 kilometres per hour. There is a continuous paved walkway on the west side of Marion Street. Marion Street terminates south of Spitfire Drive and north of Aberdeen Avenue. With build out of the proposed development, Marion Street will be constructed as a through road between Airport Road and Strathearne Place. It is noted that the extension of Marion Street is consistent with the Mount Hope Secondary Plan.
- ▶ **Strathearne Place** is a paved two-lane roadway running east-west within the study area. Strathearne Place has a rural cross-section with one travel lane in each direction and an assumed speed limit of 50 kilometres per hour. There is no paved sidewalk on either side of Strathearne Place.

Intersection Description

The following describes the key study area intersections:

- ▶ **Airport Road at Marion Street** intersect to form a 3-way unsignalized intersection. Airport Road provides a single multi-use lane in both the eastbound and westbound directions. Marion Street operates as the minor street approach with stop control and a single multi-use lane in the northbound direction.
- ▶ **Marion Street at Strathearne Place** intersect to form a 3-way unsignalized intersection. Strathearne Place provides a single multi-use lane in both the eastbound and westbound directions. Marion Street operates as the minor street approach with stop control and a single multi-use lane in the southbound direction.
- ▶ **Homestead Drive at Strathearne Place** intersect to form a 4-way unsignalized intersection. Strathearne Place provides a single multi-use lane in both the eastbound and westbound directions. Homestead Drive provides a single multi-use lane in both the northbound and southbound directions. Strathearne Place/3359 Driveway operate as the minor street



approaches (although there is currently no stop sign for 3359 Driveway) with single multi-use lanes in eastbound and westbound directions.

Traffic Network

The weekday AM and PM peak periods were used as the basis for this evaluation. Turning movement counts were collected by Pyramid Traffic Inc. at the intersections within the study area in early December 2017. Copies of the traffic volume count data are provided in **Appendix B**. The resulting 2017 Base Year traffic volumes for the weekday AM and PM peak hours are presented **Figure 2 (Enclosed)**.

Development Program

The development parcel consists of 6.53 ha of land which is vacant. The development concept consists of 117 residential units to be built between Spitfire Drive and Aberdeen Avenue. Full build out is assumed to occur at or before 2021.

Modified Road Network

The concept plan provides for an extension of Marion Street through the development parcel resulting in a through road between Airport Road and Strathearne Place. In addition to the extension of Marion Street, Spitfire Drive will be extended to the west connecting to the Mountaingate development parcel. The provision of these roadway extensions will improve connectivity and route selection within the study area.

The proposed extension of Marion Street and Spitfire Drive through the proposed development is consistent with the Mount Hope Secondary to provide an efficient road network that will accommodate anticipated traffic volumes at a reasonable level of service while balancing the needs of all road users and vehicles.

Figure 3 (Enclosed) illustrates the preliminary site plan.



Trip Generation

The rate at which any development generates traffic is dependent upon a number of factors such as size, location and concentration of surrounding developments. To estimate the volume of traffic generated by the development the ITE Trip Generation, 10th Edition¹ - Land Use Code (LUC) 210 - Single Family Detached has been utilized. Data for the peak hour of adjacent street traffic were used to estimated trip generation. Fitted curve equations with satisfactory R² values were applied. If no equations were available, the average rates have been applied.

In an effort to be conservative, no trip reductions to reflect increased pedestrian /cycling activity were included in the calculations. A total of 88 AM and 118 PM peak hour new vehicle trips are forecast to be added to the area roadways. **Table 1** summarizes the trip generation estimates for the weekday peak hours.

TABLE 1: TRIP GENERATION SUMMARY

Land Use Code	Units	Trips	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total
210 - Single Family Detached	117	Total ^a	22	66	88	74	44	118
Total Trip Generation	117	Net New	22	66	88	74	44	118

^a Trip Generation estimate based on ITE Fitted Curve

Trip Distribution and Assignment

Traffic distribution used for the purposes of this report was taken from the Mountaingate TIS. The distribution from that report was obtained from distribution patterns in the Transportation Tomorrow Survey results. The results are summarized by direction and likely route that vehicles would take to travel that direction. **Table 2** outlines the trip distribution for this study.

TABLE 2: TRIP DISTRIBUTION SUMMARY

Direction (To/From)	Travel Route	Percent Assigned To Route
East	Airport Road	41%
West	Airport Road	39%
West	Street A	10%
South	Homestead Drive	10%
Total		100%

Using the trip generation and trip distribution estimates, the site traffic was assigned to the road network. The assignment of site generated traffic to specific travel routes was based on observed traffic flow conditions on available routes, and the assumption that most motorists will seek the fastest

¹ Trip Generation Tenth Edition, Institute of Transportation Engineers, Washington D.C., 2017



and most direct routes to and from the site. The weekday AM peak hour and PM peak hour site generated traffic volumes are illustrated in **Figure 4 (Enclosed)**.

Background and Total Growth

Traffic growth on area roadways is a function of the expected land development, economic activity, and changes in demographics. A frequently used procedure is to estimate an annual percentage increase and apply that increase to the study area traffic volumes. An alternative procedure is to identify estimated traffic generated by specific planned major developments that would be expected to affect the project study area roadways. For the purposes of this assessment, both methods were utilized.

Site Specific Growth

Projections from the 8521 and 8527 Airport Road TIS² have been included in the background traffic projections. This study provides the best source for the overall development context and traffic growth expectations for the immediate study area. This report provides traffic forecast for a planning horizon of 2023 with a development assumption of 520± residential units, 112,000± square feet of retail space, one elementary school.

General Growth

In addition to accounting for development application in the study area, an annual growth rate of one (1) percent has been included to account for general traffic growth in the proximate area based on projections in the Airport Employment Growth District (AEGD) study³. **Figure 5 (Enclosed)** illustrates the resulting 2022 background traffic volume networks for the weekday AM and PM peak hours are presented in.

Traffic Diversion

By providing a continuous point of access from Airport Road to the Strathearne Place through Marion Street, this type of configuration may attract local neighbourhood traffic along Strathearne Place, Aberdeen Avenue and Spitfire Drive as the extension would improve connectivity to the external road network. Additionally, the extension may also attract a small amount of traffic from the intersections of Airport Road at Marion Street and Homestead Drive at Strathearne Place. However, as the extension does not provide for a shorter route/travel time for a clear majority of vehicles travelling to/from the south along Homestead Drive, a significant diversion is not anticipated. **Figure 6 (Enclosed)** illustrates the proposed diverted traffic.

Future Projections

The projected site-generated traffic volumes were added to the background and diverted traffic projections to develop the total traffic volumes. **Figure 7 (Enclosed)** illustrates the 2022 total traffic volume networks for the weekday AM and PM peak hours.

² 160920: 8521 & 8527 Airport Road – Traffic Impact Study and Parking Study, Paradigm, June 2017.

³ Airport Employment Growth District Transportation Master Plan, City of Hamilton, June 2011.



Traffic Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess quality of flow, roadway capacity analysis was conducted with respect to 2017 Base traffic conditions and projected 2022 Background and Total traffic conditions.

Level of service (LOS) is the term that defines the conditions that may occur on a given roadway or at an intersection when accommodating various traffic volume loads and were calculated based on the criteria published in the 2000 Highway Capacity Manual⁴. Levels of service range from A to F with LOS A representing the best vehicular operating conditions and LOS F representing the most congested. For unsignalized intersections, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. The level of service is only determined for left turns from the main street and all movements from the minor street.

Table 3 summarize the capacity analyses for the study area intersections, respectively. The capacity analyses results are included in **Appendix C**. The following is noted:

- ▶ Individual movements at the unsignalized intersection of Airport Road at Marion Street currently operate at LOS B or better under the Base conditions. Similar levels of operation are expected under future Background and Total conditions with only negligible increases in delay resulting from site-generated traffic volumes.
- ▶ Individual movements at the unsignalized intersection of Marion Street at Strathearne Place currently operate at LOS A under the Base conditions. Similar levels of operation are expected under future Background and Total conditions with only negligible increases in delay resulting from site-generated traffic volumes.
- ▶ Individual movements at the all-way stop intersection of Homestead Drive at Strathearne Place currently operate at LOS A under the Base conditions. Similar levels of operation are expected under future Background and Total conditions with only negligible increases in delay resulting from site-generated traffic volumes.

⁴ Highway Capacity Manual, Federal Highway Administration, Transportation Research Board, 2000.



TABLE 3: INTERSECTION CAPACITY ANALYSIS

Location	Movement	Base (2017)				Background (2022)				Total (2022)			
		V/C ^a	Del ^b	LOS ^c	Q ^d	V/C ^a	Del ^b	LOS ^c	Q ^d	V/C ^a	Del ^b	LOS ^c	Q ^d
01. Airport Road at Marion Drive (TWSC)													
<i>Weekday AM Peak Hour</i>	WB L/T	0.00	0	A	0	0.02	1	A	0	0.03	1	A	1
	NB L/R	0.05	12	B	1	0.12	14	B	3	0.35	19	C	12
	OVERALL		1	A			1	A			3	A	
<i>Weekday PM Peak Hour</i>	WB L/T	0.02	1	A	1	0.04	1	A	1	0.07	2	A	2
	NB L/R	0.04	12	B	1	0.09	15	B	2	0.24	18	C	7
	OVERALL		1	A			1	A					
02. Marion Drive at Strathearne Place (TWSC)													
<i>Weekday AM Peak Hour</i>	EB L/T	0.00	0	A	0	0.00	0	A	0	0.01	5	A	0
	SB L/R	0.02	9	A	0	0.02	9	A	1	0.03	9	A	1
	OVERALL						5	A			5	A	
<i>Weekday PM Peak Hour</i>	EB L/T	0.00	0	A	0	0.00	0	A	0	0.01	5	A	0
	SB L/R	0.01	9	A	0	0.01	9	A	0	0.03	9	A	0
	OVERALL		2	A			2	A			3	A	
03. Homestead Drive at Strathearne Place (AWSC)													
<i>Weekday AM Peak Hour</i>	EB L/T/R	0.04	8	A	-	0.04	8	A	-	0.03	7	A	-
	WB L/T/R	0.00	8	A	-	0.00	8	A	-	0.00	8	A	-
	NB L/T/R	0.19	8	A	-	0.21	8	A	-	0.22	8	A	-
	SB L/T/R	0.08	8	A	-	0.09	8	A	-	0.08	8	A	-
	OVERALL		8	A			8	A			8	A	
<i>Weekday PM Peak Hour</i>	EB L/T/R	0.03	8	A	-	0.03	8	A	0	0.03	8	A	-
	WB L/T/R	0.00	8	A	-	0.00	0	A	0	0.00	8	A	-
	NB L/T/R	0.13	8	A	-	0.15	8	A	0	0.16	8	A	-
	SB L/T/R	0.29	9	A	-	0.34	9	A	0	0.33	9	A	-
	OVERALL		8	A			9	A			9	A	

a volume to capacity ratio, unless awsc where degree of utilization is summarized
b vehicle delay in seconds per vehicle
c level of service
d average queue measured in vehicles
o Signal timings optimized
>120 v/c ratio exceeds 1.2; delay cannot be accurately calculated, assumed to exceed 120 seconds
95th percentile volume exceeds capacity, queue may be longer
N/A Not Applicable under this scenario

TCS traffic control signal
TWSC two-way stop control
AWSC all-way stop control
RBT roundabout



Left Turn Lanes

The unsignalized intersections within the study area were assessed to determine if the projected traffic volumes warrant installation of a left turn lane along the major roadway. The warrants for left-turn lanes follow the requirements in the Ministry of Transportation's (MTO) Geometric Design Standards⁵. A design speed of 10 kilometres per hour over the posted speed limit and the volumes associated with the 2022 Total conditions has been utilized. The percentages of left-turning vehicles in the approaching volume were rounded to the nearest 5 percent, as nomographs are only provided for 5 percent increments. The left turn lane warrant nomographs are attached in **Appendix D**. The following is noted:

- ▶ A westbound left turn with 15 metres of storage is warranted along Airport Road at Marion Street under Background conditions. No additional storage is required under the Total conditions. Recognizing that implementation of a westbound left turn lane along Airport Road at Marion Street would be negligible in terms of operational improvements, as the westbound through movements along Airport Road is projected to operate at level of service "A" with no more than 2 seconds of delay, the City of Hamilton is recommended to review and determine the feasibility of this turn lane.
- ▶ An eastbound left turn lane is not warranted along Strathearne Place at Marion Street under the Total conditions.
- ▶ As Homestead Drive and Strathearne Place operates with all-way stop control, left-turn lane warrant analysis was not carried out as multi-use lane approaches are not recommended for all-way stop intersections.

Neighbourhood Cut-Through

Speeding and cut-through traffic are possible concerns along through roadways that provide connections to major collector or arterial roadways. With the extension of Marion Street between Airport Road and Strathearne Place, a through road will be created.

Marion Street Extension

Paradigm does not anticipate the Marion Street extension to be favoured as a cut-through route for vehicles travelling south along Homestead Drive and west along Airport Road. As Marion Street currently provides for a secondary connection to Homestead Drive through Longview Drive, the current traffic volumes collected as part of this study do not reflect excessive volumes contributed to cut-through traffic. As vehicles are currently not utilizing Longview Drive to by-pass the Airport Road and Homestead Drive intersection, it is reasonable to assume that the Marion Street extension will not be utilized as a cut-through route.

To provide further validity, the projected travel times of both routes have been calculated based on uninterrupted travel time (length of route multiplied by the travel speed) and the amount of delay motorists would experience at the various intersections along the route.

⁵ TAC - Geometric Design Standards for Ontario Highways, Table 2.3.8.1 (Ratio 25:1), 2017



Table 4 outlines the projected travel time calculations depicting the Marion Street route to be 7 second slower than the Homestead Route.

TABLE 4: PROJECTED TRAVEL TIME FROM THE SOUTH

Route	Uninterrupted Travel Time	Intersection Delay	Total Time
A - Marion Street	40 Seconds ^a	27 Seconds ^c	67 Seconds
B - Homestead Drive	45 Seconds ^b	15 Seconds ^d	60 Seconds

^a Route A (length - 807 metres, travel speed 50 km/h)

^b Route b (length - 901 metres, travel speed 50 km/h)

^c 2022 Total average delay for northbound approach at Airport Road and Marion Street + 8 seconds of delay for AWS at Marion Street and Longview Drive.

^d 2023 Total average delay for northbound approach at Airport Road and Homestead Drive (8521 & 8527 Airport Road TIS)

The Marion Street extension will mostly likely be favoured by residents along Spitfire Drive, Marion Street and Strathearne Place to improve circulation to/from the external road network. As a result, traffic calming measures are not recommended at this time.

Spitfire Drive Extension

The Spitfire Drive extension through the proposed development is proposed to provide connectivity for the proposed development and the existing residential neighbourhood, rather than to provide additional access and egress capacity for development traffic. This connectivity is beneficial for a number of reasons:

- ▶ Local street connections between different areas of a neighbourhood facilitates interaction among all residents and helps foster a greater sense of community.
- ▶ The Spitfire Drive extension provides additional vehicle routes both for the existing neighbourhood and for the new developments. These additional vehicle routes enable traffic to distribute more evenly over the local streets and to offer greater travel convenience for residents. In this regard, the Spitfire Drive connection will benefit existing and future residents.
- ▶ Additional street connections offer greater accessibility and flexibility for emergency services to travel to all parts of the neighbourhood. For example, the Spitfire Drive connection will increase the flexibility of emergency services access to the existing neighbourhood.
- ▶ The Spitfire Drive extension will facilitate the ongoing operations of various local municipal services such as garbage pick-up, road maintenance, specialized transit vehicle routing, police patrols and other services that operate along the community streets.

It is acknowledged that there will likely be some additional traffic travelling along Spitfire Drive once the extension is constructed, this level of increase is projected to be minor and predominantly local traffic as opposed to cut-through traffic.



Conclusions

The proposed development concept consists of constructing 117 residential units between Spitfire Drive and Aberdeen Avenue. Full build out is assumed to occur at or before 2021. The trip generation estimates indicate that 88 trips during the weekday AM peak hour and 118 trips during the weekday PM peak hour are projected.

The concept plan provides for an extension of Marion Street through the development parcel providing a through road between Airport Road and Strathearne Place. In addition to the extension of Marion Street, Spitfire Drive will be extended to the west connecting to the Mountaingate development parcel. The provision of these extensions will improve connectivity and route selection for local residents as opposed to being favoured as a cut-through route given travel time benefits are not realized through the extensions.

Detailed traffic analysis was conducted for each of the study area intersections under 2017 Base traffic conditions and 2022 Background and Total conditions. The capacity analysis showed that the study area intersections are not expected to experience significant impacts to operations as a result of the development program.

While no capacity issues are projected at the intersection of Airport Road and Marion Street, a westbound left turn lane with 15 metres of storage is warranted under the 2022 Background conditions. The proposed development does not trigger the need for this turn lane or any additional storage requirements. Recognizing that the need for this improvement is related to existing and broader area development traffic, the requirement for this turn lane is not the applicant's responsibility nor should the requirement for this turn lane form any condition of draft plan of subdivision approval.

Overall, the study finds that site generated traffic will not have a significant impact on traffic operations within the study area and the existing transportation infrastructure in the area can adequately accommodate the traffic volumes projected to be generated by the proposed development.

We trust that the foregoing information will meet your requirements. Please do not hesitate to contact us if we can be of further assistance.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

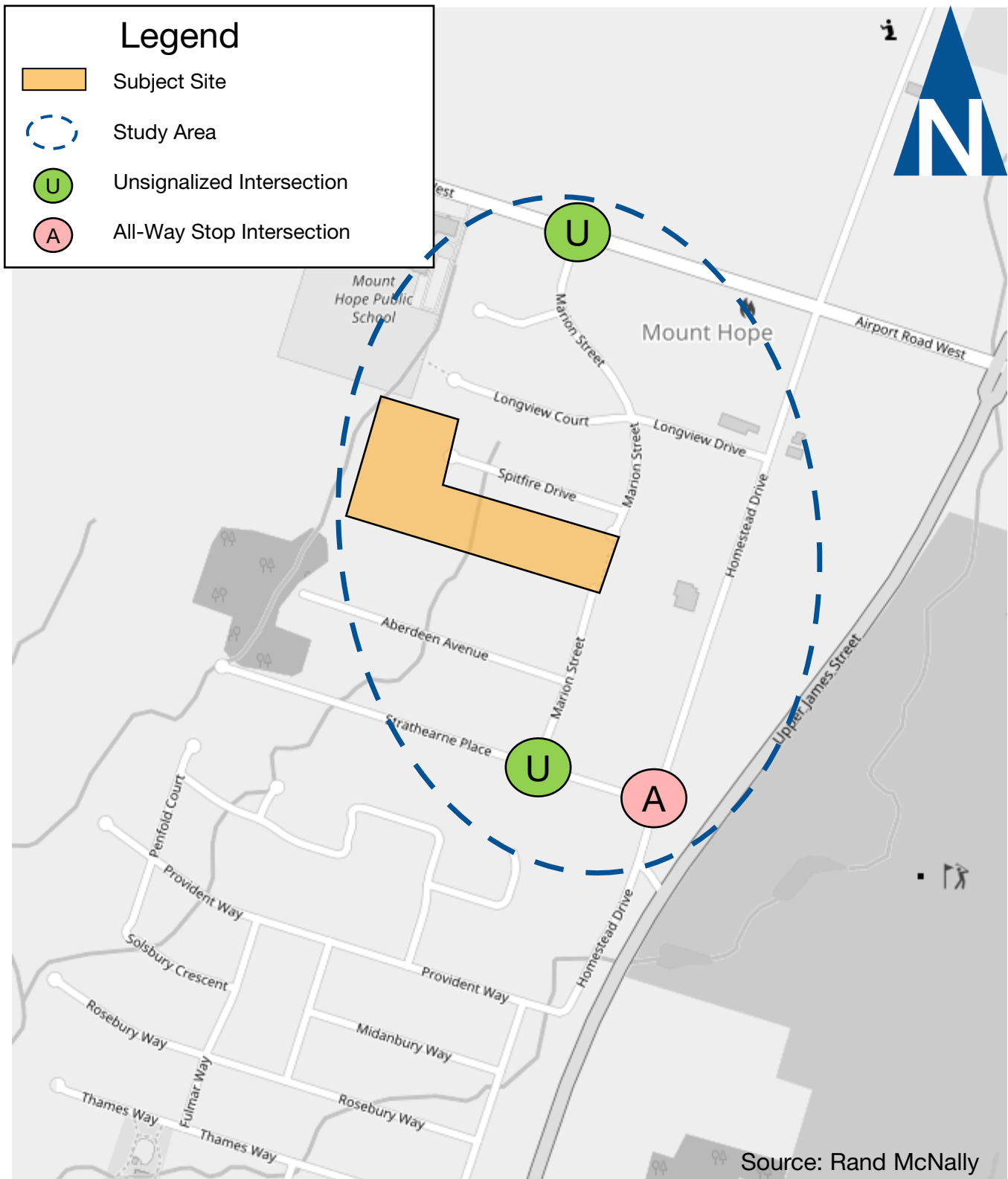


Stew Elkins
B.E.S., MITE
Vice-President

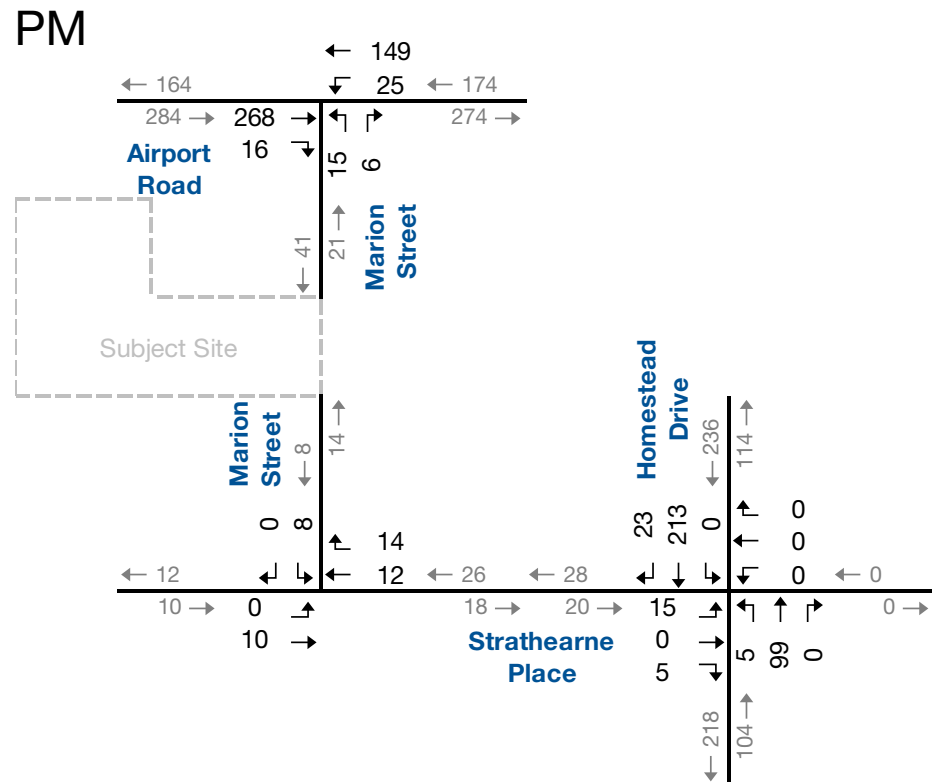
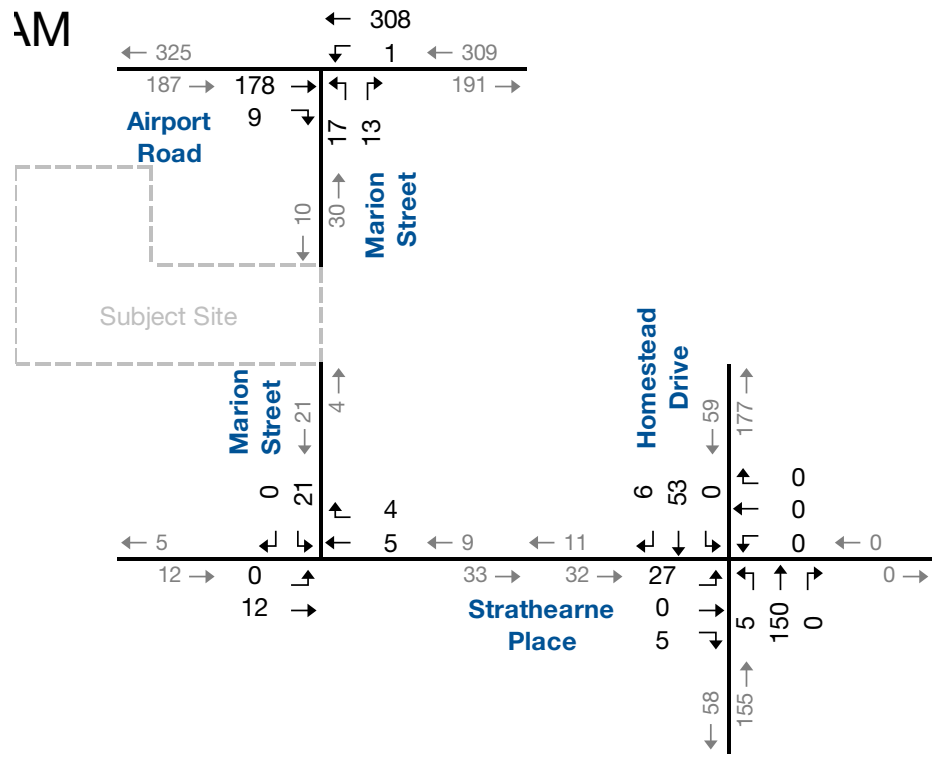


ATTACHMENTS

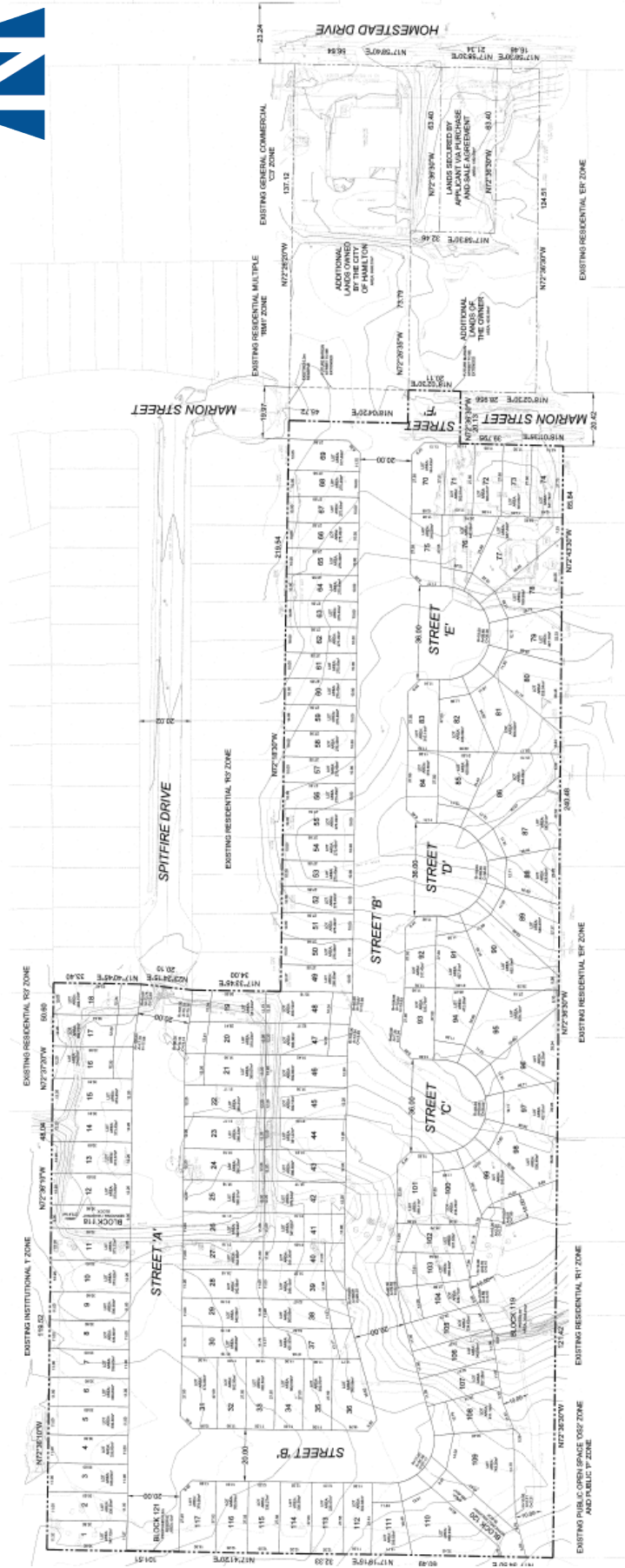




Study Area and Subject Development Location



Base Year Peak Hour Traffic Volumes

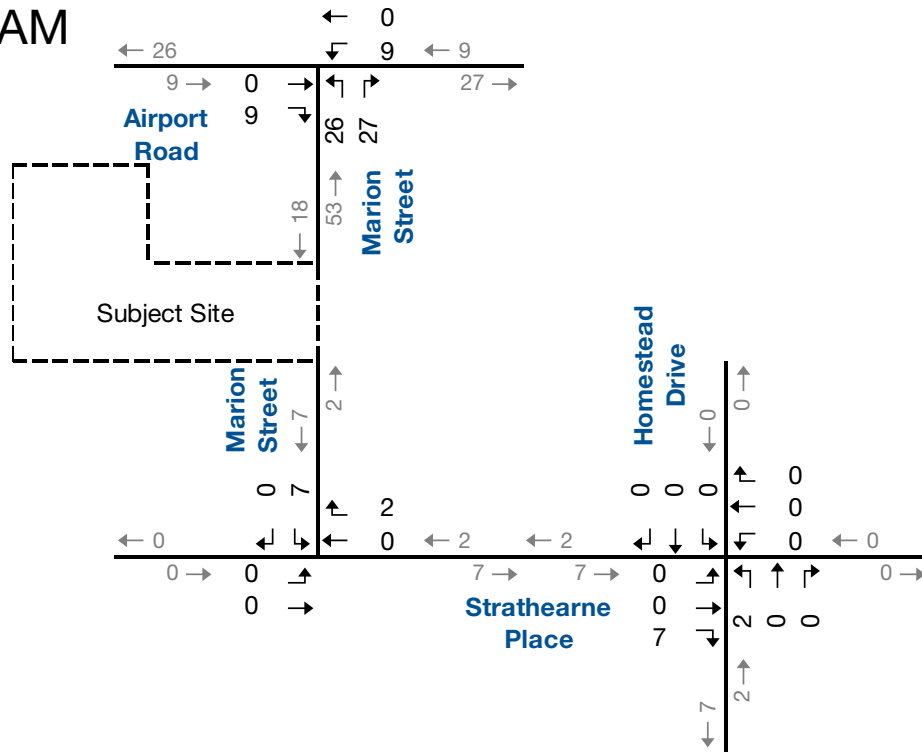


Site Plan

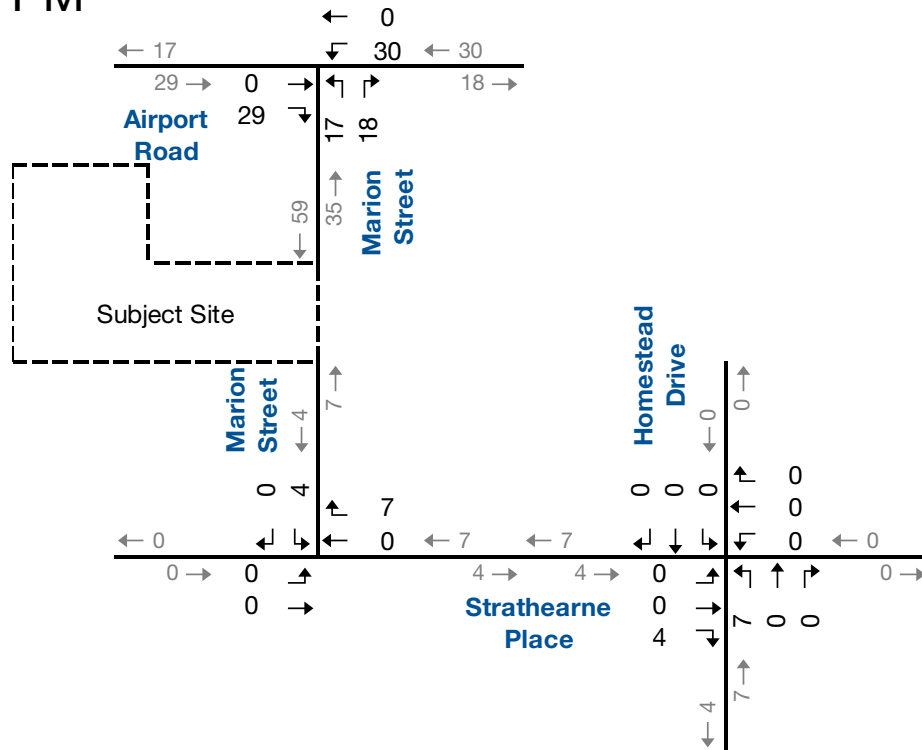
80 Marion Street, Mount Hope – Transportation Brief

Figure 3

Weekday AM

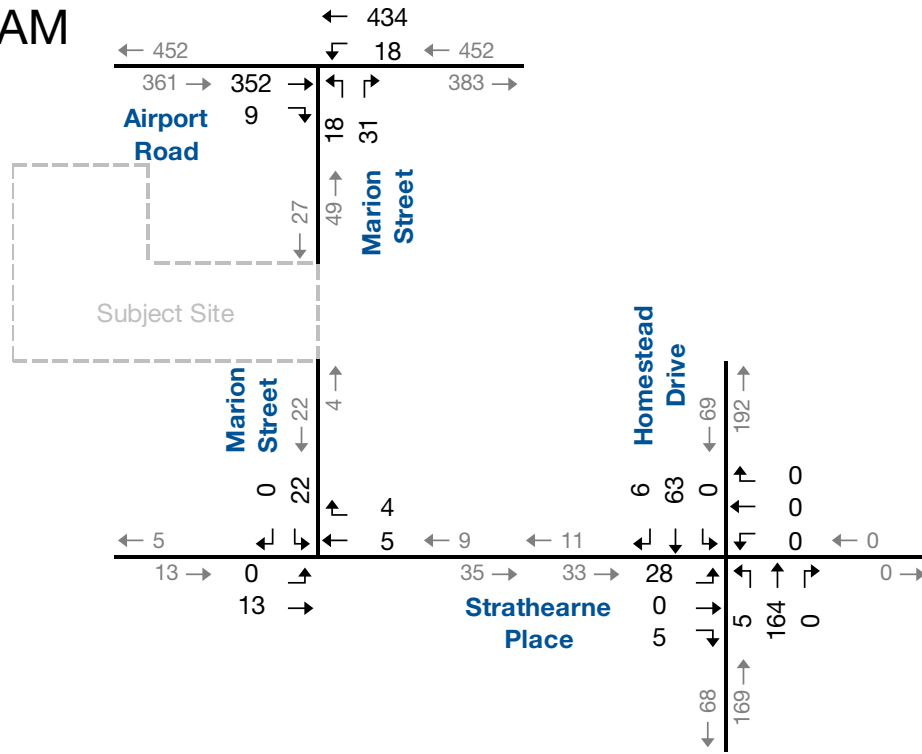


Weekday PM

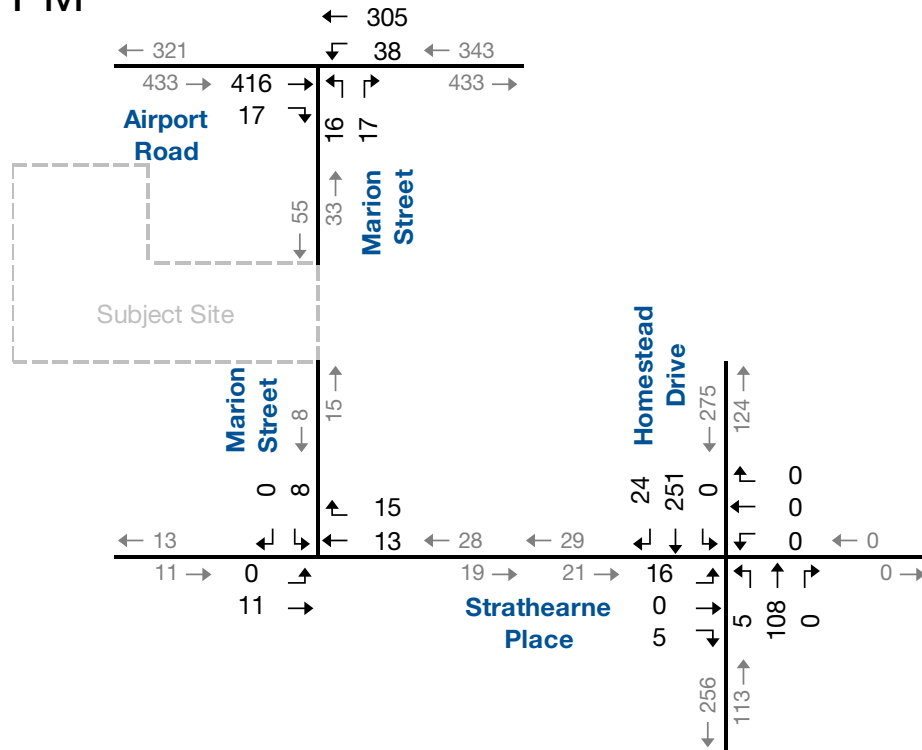


Site Generated Peak Hour Traffic Volumes

Weekday AM

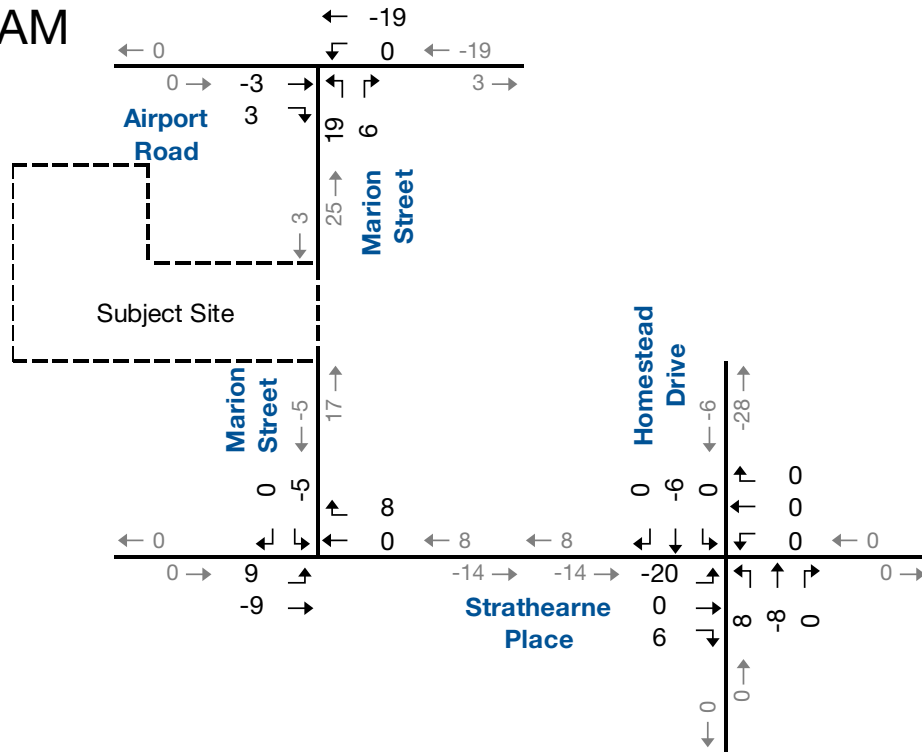


Weekday PM

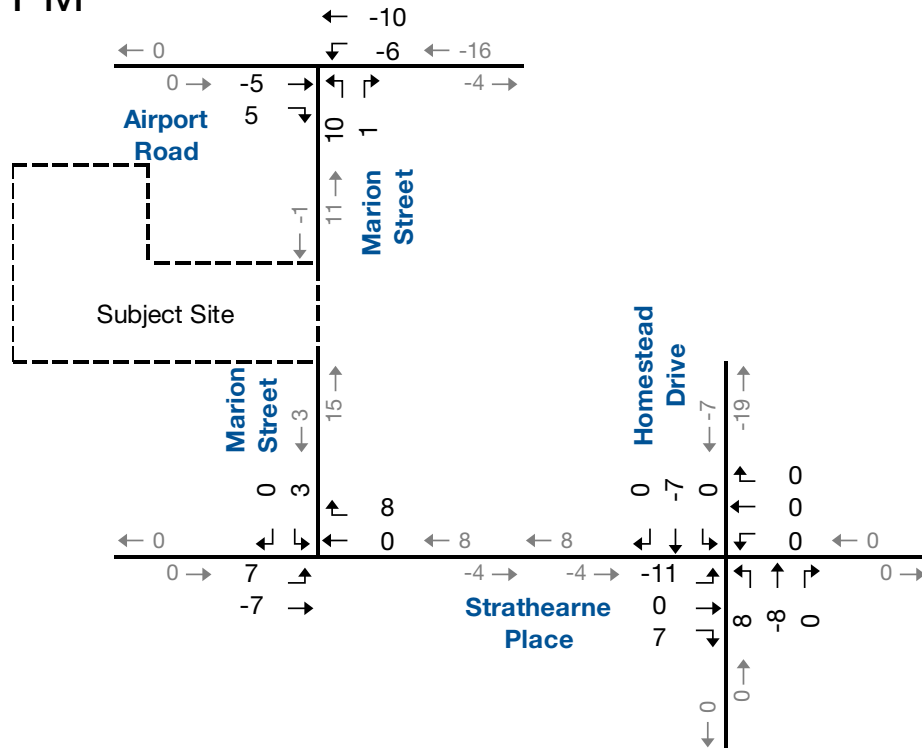


2022 Background Peak Hour Traffic Volumes

Weekday AM

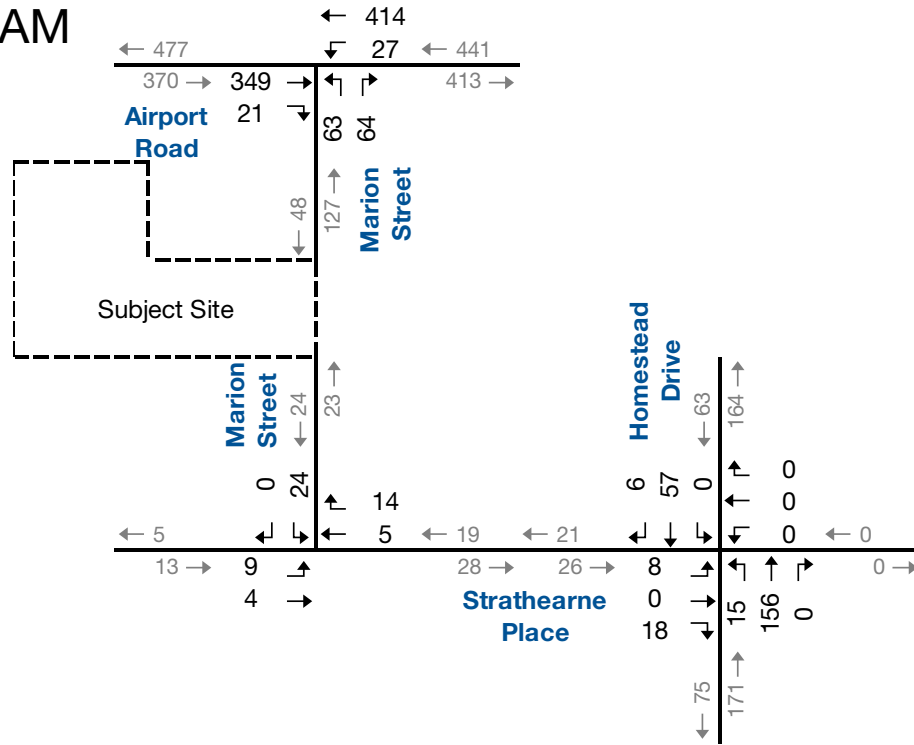


Weekday PM

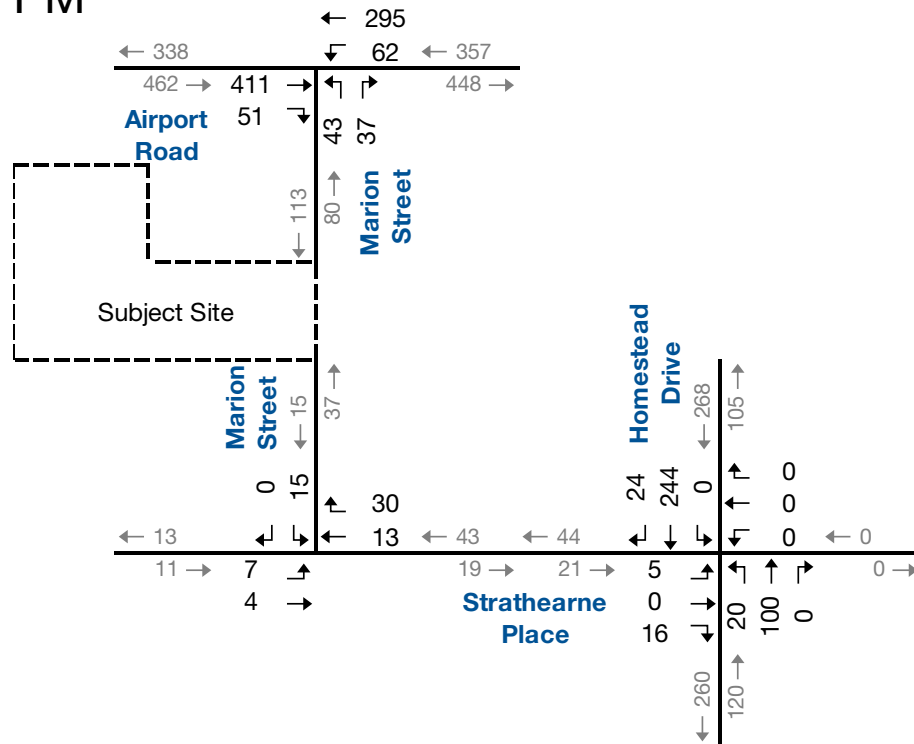


Projected Diverted Traffic

Weekday AM



Weekday PM



2022 Total Peak Hour Traffic Volumes

APPENDIX A
TERMS OF REFERENCE



From: Lucas, Sandra [<mailto:Sandra.Lucas@hamilton.ca>]

Sent: Thursday, November 9, 2017 11:16 AM

To: Andrew Eldebs <aeldebs@branthaven.com>

Cc: Declair, Robert <Robert.Declair@hamilton.ca>; Rybensky, Yvette <Yvette.Rybensky@hamilton.ca>; Harrison-McMillan, Kimberley <Kimberley.Harrison-McMillan@hamilton.ca>

Subject: RE: Branthaven Mount Hope TIS Scope (80 Marion Drive, FC-16-084) Transportation Planning Services (formerly Corridor Management)

Good morning Andrew,

I received your phone message yesterday regarding possible reduction of TIS scope for the subject site. Thank you for the follow up e-mail clarifying your request.

I was not aware there had been conversations to reduce scope for the TIS. Typically these would have taken place between Transportation Planning Services (formerly Corridor Management), the developer and traffic consultant. Based on our original oversight requiring a TIS, I understand you wish to expedite this and can offer a reduction in scope.

A Traffic Impact Brief will be sufficient for this application. This brief is to measure existing & estimated future total traffic volumes generated from the new development. It must also identify any traffic improvements (i.e. traffic control devices, additional lanes, etc.) required on the affected municipal roadways. It can have a limited study area and only 1-year Horizon year will be necessary from full build out of the site. The brief must be submitted in hardcopy and digital format.

Mainly, our interest is how the Marion Street completion will affect traffic patterns such as:

- 1) Requirements for traffic calming measures on Marion?
- 2) Potential traffic control changes at Airport and Marion; Marion and Strathearne; Strathearne and Homestead
- 3) Other potential scenarios

I trust this helps.

Sandra Lucas

Traffic Planning Technologist
Transportation Planning Services
Public Works Department
77 James Street North, Suite 400

Tel: 905-546-2424 ext 4575

Email: Sandra.Lucas@Hamilton.ca



www.hamilton.ca/canada150

From: Andrew Eldebs [<mailto:aeldebs@branthaven.com>]

Sent: November-08-17 2:26 PM

To: Harrison-McMillan, Kimberley; Lucas, Sandra

Cc: Declair, Robert; Rybensky, Yvette

**APPENDIX B
TRAFFIC DATA**



Airport Rd @ Marion St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:15:00

To: 8:15:00

Municipality: Hamilton
Site #: 000000001
Intersection: Airport Rd & Marion St
TFR File #: 1
Count date: 29-Nov-2017

Weather conditions:

Clear/Dry

Person(s) who counted:

Cam

**** Non-Signalized Intersection ****

Major Road: Airport Rd runs W/E

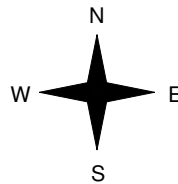
East Leg Total: 500
 East Entering: 309
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
14	3	308	325



Airport Rd

Heavys	Trucks	Cars	Totals
7	1	170	178
0	1	8	9
7	2	178	



Marion St

Cars	Trucks	Heavys	Totals
292	2	14	308
1	0	0	1
293	2	14	



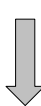
Airport Rd

Cars	Trucks	Heavys	Totals
182	2	7	191

Peds Cross: ∞
 South Peds: 8
 South Entering: 30
 South Leg Total: 40

Peds Cross: ∞
 West Peds: 3
 West Entering: 187
 West Leg Total: 512

Cars	9		
Trucks	1		
Heavys	0		
Totals	10		



Cars	16	12	28
Trucks	1	1	2
Heavys	0	0	0
Totals	17	13	

Comments

Airport Rd @ Marion St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Hamilton
Site #: 000000001
Intersection: Airport Rd & Marion St
TFR File #: 1
Count date: 29-Nov-2017

Weather conditions:

Clear/Dry

Person(s) who counted:

Cam

**** Non-Signalized Intersection ****

Major Road: Airport Rd runs W/E

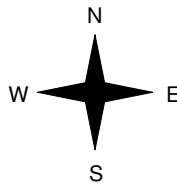
East Leg Total: 448
 East Entering: 174
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
6	3	155	164



Airport Rd

Heavys	Trucks	Cars	Totals
3	3	262	268
0	0	16	16
3	3	278	



Marion St

Cars	Trucks	Heavys	Totals
140	3	6	149
23	0	2	25
163	3	8	



Airport Rd

Cars	Trucks	Heavys	Totals
268	3	3	274

Peds Cross: ∞
 South Peds: 11
 South Entering: 21
 South Leg Total: 62

Peds Cross: ∞
 West Peds: 0
 West Entering: 284
 West Leg Total: 448

Cars	39		
Trucks	0		
Heavys	2		
Totals	41		



Cars	15	6	21
Trucks	0	0	0
Heavys	0	0	0
Totals	15	6	

Comments

Airport Rd @ Marion St

Total Count Diagram

Municipality: Hamilton
Site #: 000000001
Intersection: Airport Rd & Marion St
TFR File #: 1
Count date: 29-Nov-2017

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Non-Signalized Intersection ****

Major Road: Airport Rd runs W/E

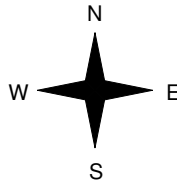
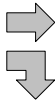
East Leg Total: 2100
 East Entering: 995
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
49	13	923	985



Airport Rd

Heavys	Trucks	Cars	Totals
34	12	1020	1066
2	3	67	72
36	15	1087	



Marion St



Cars	Trucks	Heavys	Totals
865	12	49	926
66	1	2	69
931	13	51	

Airport Rd



Cars	Trucks	Heavys	Totals
1054	13	38	1105

Peds Cross: ∞
 West Peds: 4
 West Entering: 1138
 West Leg Total: 2123

Cars	133
Trucks	4
Heavys	4
Totals	141



Cars	58	34	92
Trucks	1	1	2
Heavys	0	4	4
Totals	59	39	

Peds Cross: ∞
 South Peds: 35
 South Entering: 98
 South Leg Total: 239

Comments

Marion St @ Strathearne PI

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:30:00

To: 8:30:00

Municipality: Hamilton
Site #: 000000002
Intersection: Strathearne PI & Marion St
TFR File #: 2
Count date: 29-Nov-2017

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Non-Signalized Intersection ****

Major Road: Strathearne PI runs W/E

North Leg Total: 25

North Entering: 21

North Peds: 5

Peds Cross: \times

Heavys	0	0	0
Trucks	0	0	0
Cars	0	21	21
Totals	0	21	



Heavys 0

Trucks 0

Cars 4

Totals 4

East Leg Total: 42

East Entering: 9

East Peds: 0

Peds Cross: \times

Heavys	Trucks	Cars	Totals
1	0	4	5



Marion St



Cars Trucks Heavys Totals

4 0 0 4

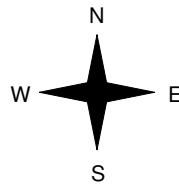


4 0 1 5

8 0 1



Strathearne PI



Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	12	12



Strathearne PI



Heavys	Trucks	Cars	Totals
0	0	12	

Cars Trucks Heavys Totals

33 0 0 33

Peds Cross: \times

West Peds: 1

West Entering: 12

West Leg Total: 17

Comments

Marion St @ Strathearne PI

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 17:00:00

To: 18:00:00

Municipality: Hamilton
Site #: 000000002
Intersection: Strathearne PI & Marion St
TFR File #: 2
Count date: 29-Nov-2017

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Non-Signalized Intersection ****

Major Road: Strathearne PI runs W/E

North Leg Total: 22
 North Entering: 8
 North Peds: 0
 Peds Cross: \times

Heavys	0	0	0
Trucks	0	0	0
Cars	0	8	8
Totals	0	8	



Heavys	0
Trucks	0
Cars	14
Totals	14

East Leg Total: 44
 East Entering: 26
 East Peds: 0
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	0	12	12



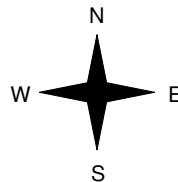
Marion St



Cars	Trucks	Heavys	Totals
14	0	0	14
12	0	0	12
26	0	0	



Strathearne PI



Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	10	10
0	0	10	



Strathearne PI



Cars	Trucks	Heavys	Totals
18	0	0	18

Peds Cross: \times
 West Peds: 0
 West Entering: 10
 West Leg Total: 22

Comments

Marion St @ Strathearne PI

Total Count Diagram

Municipality: Hamilton
Site #: 000000002
Intersection: Strathearne PI & Marion St
TFR File #: 2
Count date: 29-Nov-2017

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Non-Signalized Intersection ****

Major Road: Strathearne PI runs W/E

North Leg Total: 90
 North Entering: 49
 North Peds: 8
 Peds Cross: \times

Heavys	0	1	1	1
Trucks	0	0	0	0
Cars	1	47	48	48
Totals	1	48	48	48



Heavys	1
Trucks	0
Cars	40
Totals	41

East Leg Total: 162
 East Entering: 71
 East Peds: 1
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
1	0	31	32



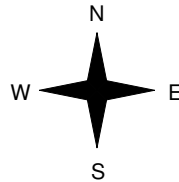
Marion St



Cars	Trucks	Heavys	Totals
40	0	0	40
30	0	1	31
70	0	1	



Strathearne PI



Heavys	Trucks	Cars	Totals
1	0	0	1
0	0	43	43
1	0	43	



Strathearne PI



Cars	Trucks	Heavys	Totals
90	0	1	91

Peds Cross: \times
 West Peds: 3
 West Entering: 44
 West Leg Total: 76

Comments

Strathearne Pl @ Homestead Dr

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Hamilton
Site #: 000000003
Intersection: Homestead Dr & Strathearne Pl
TFR File #: 3
Count date: 29-Nov-2017

Weather conditions:
Clear/Dry
Person(s) who counted:
Cam

**** Non-Signalized Intersection ****

Major Road: Homestead Dr runs N/S

North Leg Total: 236
 North Entering: 59
 North Peds: 0
 Peds Cross: ∇

Heavys	0	8	8
Trucks	0	0	0
Cars	6	45	51
Totals	6	53	



Heavys	9
Trucks	0
Cars	168
Totals	177

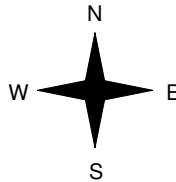
Heavys	Trucks	Cars	Totals
1	0	10	11



Homestead Dr



Strathearne Pl



Heavys	Trucks	Cars	Totals
0	0	27	27
0	0	5	5
0	0	32	



Homestead Dr



Peds Cross: ∇
 West Peds: 3
 West Entering: 32
 West Leg Total: 43

Cars	50
Trucks	0
Heavys	8
Totals	58



Cars	4	141	145
Trucks	0	0	0
Heavys	1	9	10
Totals	5	150	

Peds Cross: ∇
 South Peds: 0
 South Entering: 155
 South Leg Total: 213

Comments

Strathearne Pl @ Homestead Dr

Afternoon Peak Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:45:00
To: 17:45:00

Municipality: Hamilton
Site #: 000000003
Intersection: Homestead Dr & Strathearne Pl
TFR File #: 3
Count date: 29-Nov-2017

Weather conditions:
Clear/Dry
Person(s) who counted:
Cam

**** Non-Signalized Intersection ****

Major Road: Homestead Dr runs N/S

North Leg Total: 350
North Entering: 236
North Peds: 0
Peds Cross: \times

Heavys	0	2	2
Trucks	0	5	5
Cars	23	206	229
Totals	23	213	



Heavys	2
Trucks	0
Cars	112
Totals	114

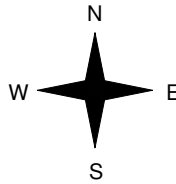
Heavys	0	0	28	Totals
0	0	28	28	



Homestead Dr



Strathearne Pl



Heavys	0	0	15	Totals
0	0	15	15	
0	0	5	5	
0	0	20		



Homestead Dr



Peds Cross: \times
West Peds: 5
West Entering: 20
West Leg Total: 48

Cars	211
Trucks	5
Heavys	2
Totals	218



Cars	5	97	102
Trucks	0	0	0
Heavys	0	2	2
Totals	5	99	

Peds Cross: \times
South Peds: 0
South Entering: 104
South Leg Total: 322

Comments

Strathearne PI @ Homestead Dr

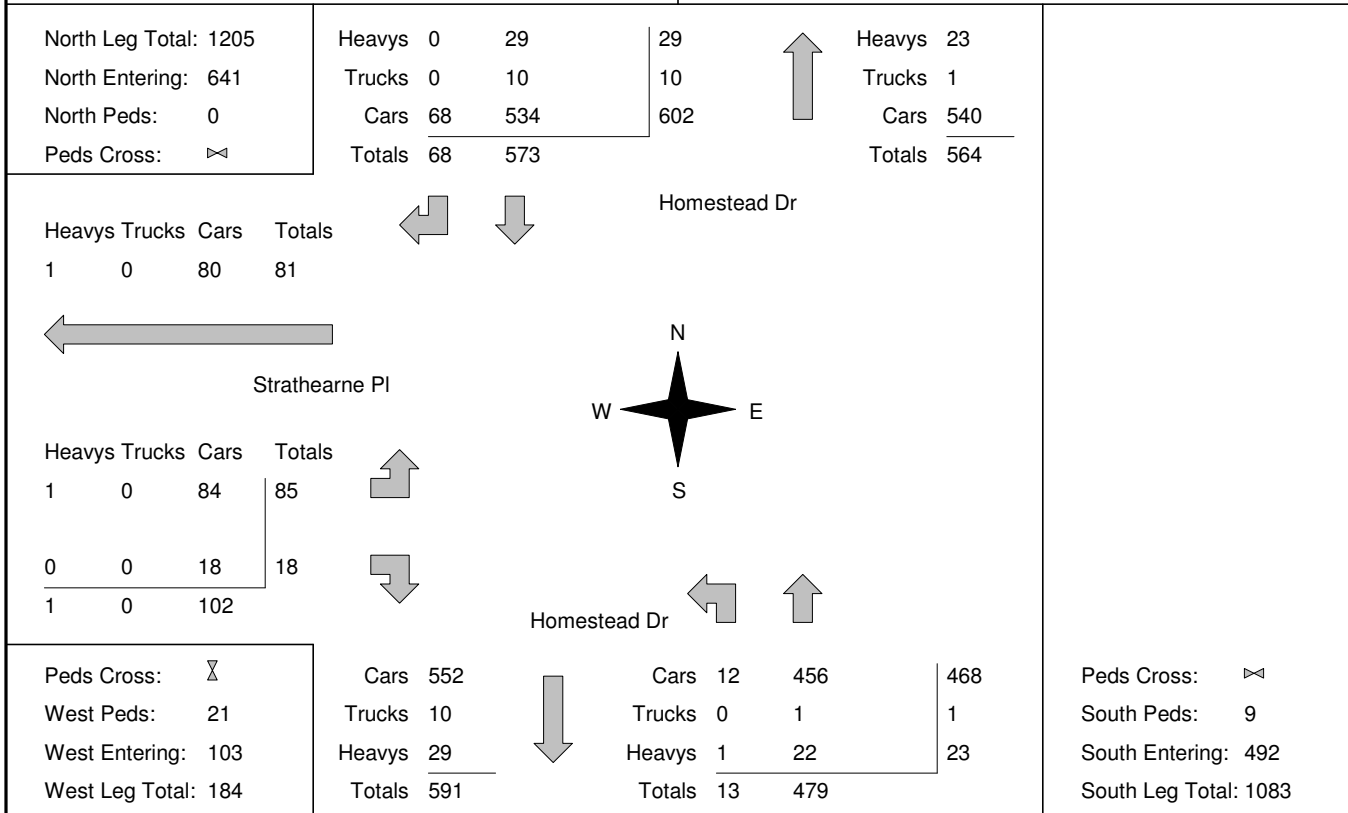
Total Count Diagram

Municipality: Hamilton
Site #: 000000003
Intersection: Homestead Dr & Strathearne PI
TFR File #: 3
Count date: 29-Nov-2017

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Non-Signalized Intersection ****

Major Road: Homestead Dr runs N/S



Comments

APPENDIX C
CAPACITY ANALYSIS CALCULATIONS



Lanes, Volumes, Timings
1: Marion Street & Airport Road

Base Year AM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (vph)	178	9	1	308	17	13
Future Volume (vph)	178	9	1	308	17	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.993				0.941	
Flt Protected					0.973	
Satd. Flow (prot)	1828	0	0	1830	1646	0
Flt Permitted					0.973	
Satd. Flow (perm)	1828	0	0	1830	1646	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	242.7			264.6	98.7	
Travel Time (s)	17.5			19.1	7.1	
Confl. Peds. (#/hr)		8	8		3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	11%	0%	5%	6%	8%
Adj. Flow (vph)	193	10	1	335	18	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	203	0	0	336	32	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	27.0% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
1: Marion Street & Airport Road

Base Year AM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	178	9	1	308	17	13
Future Volume (Veh/h)	178	9	1	308	17	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	193	10	1	335	18	14
Pedestrians	3				8	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			211		546	206
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211		546	206
IC, single (s)			4.1		6.5	6.3
IC, 2 stage (s)						
IF (s)			2.2		3.6	3.4
p0 queue free %			100		96	98
cM capacity (veh/h)			1361		486	813

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	203	336	32
Volume Left	0	1	18
Volume Right	10	0	14
cSH	1700	1361	590
Volume to Capacity	0.12	0.00	0.05
Queue Length 95th (m)	0.0	0.0	1.3
Control Delay (s)	0.0	0.0	11.5
Lane LOS	A	B	B
Approach Delay (s)	0.0	0.0	11.5
Approach LOS		B	

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: Strathearne Place & Marion Street

Base Year AM Peak Hour.syn
12/07/2017

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	0	12	5	4	21	0
Future Volume (vph)	0	12	5	4	21	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.940				
Flt Protected					0.950	
Satd. Flow (prot)	0	1921	1625	0	1825	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1921	1625	0	1825	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		247.0	147.1		197.6	
Travel Time (s)		17.8	10.6		14.2	
Confl. Peds. (#/hr)	5			5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%
Adj. Flow (vph)	0	13	5	4	23	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	13	9	0	23	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		24		14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	15.2%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
2: Strathearne Place & Marion Street

Base Year AM Peak Hour.syn
12/07/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	0	12	5	4	21	0
Future Volume (Veh/h)	0	12	5	4	21	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	13	5	4	23	0
Pedestrians		1			5	
Lane Width (m)		3.7			3.7	
Walking Speed (m/s)		1.1			1.1	
Percent Blockage		0			0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	14				25	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14				25	13
IC, single (s)	4.1				6.4	6.2
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1609				991	1067

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	13	9	23
Volume Left	0	0	23
Volume Right	0	4	0
cSH	1609	1700	991
Volume to Capacity	0.00	0.01	0.02
Queue Length 95th (m)	0.0	0.0	0.5
Control Delay (s)	0.0	0.0	8.7
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.7
Approach LOS			A

Intersection Summary

Average Delay		4.5	
Intersection Capacity Utilization	15.2%		ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
3: Homestead Drive & Strathearne Place

Base Year AM Peak Hour.syn
12/07/2017

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕
Traffic Volume (vph)	27	0	5	0	0	0	5	150	0	0	0	53
Future Volume (vph)	27	0	5	0	0	0	5	150	0	0	0	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.980										0.985
Flt Protected		0.959						0.999				
Satd. Flow (prot)	0	1805	0	0	1921	0	0	1803	0	0	0	1669
Flt Permitted		0.959						0.999				
Satd. Flow (perm)	0	1805	0	0	1921	0	0	1803	0	0	0	1669
Link Speed (k/h)		50			50			50				50
Link Distance (m)		147.1			34.4			95.3				383.1
Travel Time (s)		10.6			2.5			6.9				27.6
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	20%	6%	0%	0%	15%	0%
Adj. Flow (vph)	29	0	5	0	0	0	5	163	0	0	0	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	34	0	0	0	0	0	168	0	0	0	65
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24			14	24			14	24
Sign Control		Stop			Stop			Stop				Stop

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	21.9% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
3: Homestead Drive & Strathearne Place

Base Year AM Peak Hour.syn
12/07/2017

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕
Sign Control		Stop			Stop			Stop				Stop
Traffic Volume (vph)	27	0	5	0	0	0	5	150	0	0	0	53
Future Volume (vph)	27	0	5	0	0	0	5	150	0	0	0	53
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	0	5	0	0	0	5	163	0	0	0	58
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	34	0	5	0	168	0	0	163	0	0	0	65
Volume Left (vph)	29	0	5	0	0	0	0	0	0	0	0	0
Volume Right (vph)	5	0	0	0	7	0	0	7	0	0	0	7
Hadj (s)	0.08	0.00	0.12	0.16								
Departure Headway (s)	4.5	4.5	4.2	4.3								
Degree Utilization, x	0.04	0.00	0.19	0.08								
Capacity (veh/h)	758	774	847	820								
Control Delay (s)	7.7	7.5	8.2	7.7								
Approach Delay (s)	7.7	0.0	8.2	7.7								
Approach LOS	A	A	A	A								

Intersection Summary	
Delay	8.0
Level of Service	A
Intersection Capacity Utilization	21.9% ICU Level of Service A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: Marion Street & Airport Road

Base Year PM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↘	↘	
Traffic Volume (vph)	268	16	25	149	15	6
Future Volume (vph)	268	16	25	149	15	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.993			0.959		
Flt Protected				0.993	0.966	
Satd. Flow (prot)	1872	0	0	1809	1780	0
Flt Permitted				0.993	0.966	
Satd. Flow (perm)	1872	0	0	1809	1780	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	242.7			264.6	98.7	
Travel Time (s)	17.5			19.1	7.1	
Confl. Peds. (#/hr)		11	11			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	8%	5%	0%	0%
Adj. Flow (vph)	291	17	27	162	16	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	308	0	0	189	23	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	37.7%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
1: Marion Street & Airport Road

Base Year PM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↘	↘	
Traffic Volume (veh/h)	268	16	25	149	15	6
Future Volume (Veh/h)	268	16	25	149	15	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	291	17	27	162	16	7
Pedestrians					11	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			319		526	310
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			319		526	310
IC, single (s)			4.2		6.4	6.2
IC, 2 stage (s)						
IF (s)			2.3		3.5	3.3
p0 queue free %			98		97	99
cM capacity (veh/h)			1195		498	726

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	308	189	23
Volume Left	0	27	16
Volume Right	17	0	7
cSH	1700	1195	551
Volume to Capacity	0.18	0.02	0.04
Queue Length 95th (m)	0.0	0.5	1.0
Control Delay (s)	0.0	1.3	11.8
Lane LOS	A	B	B
Approach Delay (s)	0.0	1.3	11.8
Approach LOS		B	

Intersection Summary

Average Delay		1.0	
Intersection Capacity Utilization		37.7%	ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
2: Strathearne Place & Marion Street

Base Year PM Peak Hour.syn
12/07/2017

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	0	10	12	14	8	0
Future Volume (vph)	0	10	12	14	8	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.928				
Flt Protected					0.950	
Satd. Flow (prot)	0	1921	1631	0	1825	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1921	1631	0	1825	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		247.0	147.1		197.6	
Travel Time (s)		17.8	10.6		14.2	
Confl. Peds. (#/hr)	5			5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%
Adj. Flow (vph)	0	11	13	15	9	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	11	28	0	9	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		24		14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	15.2% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Strathearne Place & Marion Street

Base Year PM Peak Hour.syn
12/07/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	0	10	12	14	8	0
Future Volume (Veh/h)	0	10	12	14	8	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	13	15	9	0
Pedestrians		1			5	
Lane Width (m)		3.7			3.7	
Walking Speed (m/s)		1.1			1.1	
Percent Blockage		0			0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	33				36	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	33				36	26
IC, single (s)	4.1				6.4	6.2
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1584				976	1049

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	11	28	9
Volume Left	0	0	9
Volume Right	0	15	0
cSH	1584	1700	976
Volume to Capacity	0.00	0.02	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.0	0.0	8.7
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.7
Approach LOS			A

Intersection Summary

Average Delay		1.6	
Intersection Capacity Utilization	15.2%	ICU Level of Service	A
Analysis Period (min)		15	

Lanes, Volumes, Timings
3: Homestead Drive & Strathearne Place

Base Year PM Peak Hour.syn
12/07/2017

	↖	→	↘	↙	←	↖	↙	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	15	0	5	0	0	0	5	99	0	0	213	23
Future Volume (vph)	15	0	5	0	0	0	5	99	0	0	213	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.968									0.987	
Flt Protected		0.963						0.998				
Satd. Flow (prot)	0	1791	0	0	1921	0	0	1881	0	0	1846	0
Flt Permitted		0.963						0.998				
Satd. Flow (perm)	0	1791	0	0	1921	0	0	1881	0	0	1846	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		147.1			34.4			95.3			383.1	
Travel Time (s)		10.6			2.5			6.9			27.6	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Adj. Flow (vph)	16	0	5	0	0	0	5	108	0	0	232	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	21	0	0	0	0	0	113	0	0	257	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24			14	24			14	24
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.8% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
3: Homestead Drive & Strathearne Place

Base Year PM Peak Hour.syn
12/07/2017

	↖	→	↘	↙	←	↖	↙	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	0	5	0	0	0	5	99	0	0	213	23
Future Volume (vph)	15	0	5	0	0	0	5	99	0	0	213	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	0	5	0	0	0	5	108	0	0	232	25
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	21	0	113	257								
Volume Left (vph)	16	0	5	0								
Volume Right (vph)	5	0	0	25								
Hadj (s)	0.01	0.00	0.04	-0.01								
Departure Headway (s)	4.7	4.7	4.2	4.1								
Degree Utilization, x	0.03	0.00	0.13	0.29								
Capacity (veh/h)	701	706	828	878								
Control Delay (s)	7.8	7.7	7.9	8.7								
Approach Delay (s)	7.8	0.0	7.9	8.7								
Approach LOS	A	A	A	A								

Intersection Summary	
Delay	8.4
Level of Service	A
Intersection Capacity Utilization	22.8% ICU Level of Service A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: Marion Street & Airport Road

2022 Background AM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (vph)	352	9	18	434	18	31
Future Volume (vph)	352	9	18	434	18	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.997				0.915	
Flt Protected				0.998	0.982	
Satd. Flow (prot)	1839	0	0	1830	1609	0
Flt Permitted				0.998	0.982	
Satd. Flow (perm)	1839	0	0	1830	1609	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	242.7			264.6	98.7	
Travel Time (s)	17.5			19.1	7.1	
Confl. Peds. (#/hr)		8	8		3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	11%	0%	5%	6%	8%
Adj. Flow (vph)	383	10	20	472	20	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	393	0	0	492	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.4%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
1: Marion Street & Airport Road

2022 Background AM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	352	9	18	434	18	31
Future Volume (Veh/h)	352	9	18	434	18	31
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	383	10	20	472	20	34
Pedestrians	3				8	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			401		911	396
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			401		911	396
IC, single (s)			4.1		6.5	6.3
IC, 2 stage (s)						
IF (s)			2.2		3.6	3.4
p0 queue free %					93	95
cM capacity (veh/h)			1159		291	635

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	393	492	54
Volume Left	0	20	20
Volume Right	10	0	34
cSH	1700	1159	442
Volume to Capacity	0.23	0.02	0.12
Queue Length 95th (m)	0.0	0.4	3.1
Control Delay (s)	0.0	0.5	14.3
Lane LOS	A	B	B
Approach Delay (s)	0.0	0.5	14.3
Approach LOS		B	

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: Strathearne Place & Marion Street

2022 Background AM Peak Hour.syn
12/07/2017

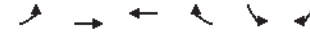


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	0	13	5	4	22	0
Future Volume (vph)	0	13	5	4	22	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.940				
Flt Protected					0.950	
Satd. Flow (prot)	0	1921	1625	0	1825	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1921	1625	0	1825	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		247.0	147.1		197.6	
Travel Time (s)		17.8	10.6		14.2	
Confl. Peds. (#/hr)	5			5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%
Adj. Flow (vph)	0	14	5	4	24	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	14	9	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		24		14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	15.2% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Strathearne Place & Marion Street

2022 Background AM Peak Hour.syn
12/07/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	0	13	5	4	22	0
Future Volume (Veh/h)	0	13	5	4	22	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	14	5	4	24	0
Pedestrians		1			5	
Lane Width (m)		3.7			3.7	
Walking Speed (m/s)		1.1			1.1	
Percent Blockage		0			0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	14				26	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14				26	13
IC, single (s)	4.1				6.4	6.2
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1609				990	1067

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	14	9	24
Volume Left	0	0	24
Volume Right	0	4	0
cSH	1609	1700	990
Volume to Capacity	0.00	0.01	0.02
Queue Length 95th (m)	0.0	0.0	0.6
Control Delay (s)	0.0	0.0	8.7
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.7
Approach LOS			A

Intersection Summary			
Average Delay		4.5	
Intersection Capacity Utilization	15.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
3: Homestead Drive & Strathearne Place

2022 Background AM Peak Hour.syn
12/07/2017

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	28	0	5	0	0	0	5	164	0	0	63	6
Future Volume (vph)	28	0	5	0	0	0	5	164	0	0	63	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.981									0.987	
Flt Protected		0.959						0.999				
Satd. Flow (prot)	0	1807	0	0	1921	0	0	1804	0	0	1669	0
Flt Permitted		0.959						0.999				
Satd. Flow (perm)	0	1807	0	0	1921	0	0	1804	0	0	1669	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		147.1			34.4			95.3			383.1	
Travel Time (s)		10.6			2.5			6.9			27.6	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	20%	6%	0%	0%	15%	0%
Adj. Flow (vph)	30	0	5	0	0	0	5	178	0	0	68	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	0	0	0	0	0	183	0	0	75	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24			14	24			14	24
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.7% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
3: Homestead Drive & Strathearne Place

2022 Background AM Peak Hour.syn
12/07/2017

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	28	0	5	0	0	0	5	164	0	0	63	6
Future Volume (vph)	28	0	5	0	0	0	5	164	0	0	63	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	0	5	0	0	0	5	178	0	0	68	7
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	35	0	183	75								
Volume Left (vph)	30	0	5	0								
Volume Right (vph)	5	0	0	7								
Hadj (s)	0.09	0.00	0.11	0.18								
Departure Headway (s)	4.6	4.5	4.2	4.3								
Degree Utilization, x	0.04	0.00	0.21	0.09								
Capacity (veh/h)	745	761	844	813								
Control Delay (s)	7.8	7.5	8.3	7.8								
Approach Delay (s)	7.8	0.0	8.3	7.8								
Approach LOS	A	A	A	A								

Intersection Summary	
Delay	8.1
Level of Service	A
Intersection Capacity Utilization	22.7% ICU Level of Service A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: Marion Street & Airport Road

2022 Background PM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↘	↘	↘
Traffic Volume (vph)	416	17	38	305	16	17
Future Volume (vph)	416	17	38	305	16	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.995			0.931		
Flt Protected				0.995	0.976	
Satd. Flow (prot)	1875	0	0	1815	1746	0
Flt Permitted				0.995	0.976	
Satd. Flow (perm)	1875	0	0	1815	1746	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	242.7			264.6	98.7	
Travel Time (s)	17.5			19.1	7.1	
Confl. Peds. (#/hr)		11	11			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	8%	5%	0%	0%
Adj. Flow (vph)	452	18	41	332	17	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	470	0	0	373	35	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	54.5% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
1: Marion Street & Airport Road

2022 Background PM Peak Hour.syn
12/07/2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↘	↘	↘
Traffic Volume (veh/h)	416	17	38	305	16	17
Future Volume (Veh/h)	416	17	38	305	16	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	452	18	41	332	17	18
Pedestrians					11	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			481		886	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			481		886	472
IC, single (s)			4.2		6.4	6.2
IC, 2 stage (s)						
IF (s)			2.3		3.5	3.3
p0 queue free %			96		94	97
cM capacity (veh/h)			1040		302	590

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	470	373	35
Volume Left	0	41	17
Volume Right	18	0	18
cSH	1700	1040	403
Volume to Capacity	0.28	0.04	0.09
Queue Length 95th (m)	0.0	0.9	2.2
Control Delay (s)	0.0	1.3	14.8
Lane LOS	A	B	B
Approach Delay (s)	0.0	1.3	14.8
Approach LOS		B	

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: Strathearne Place & Marion Street

2022 Background PM Peak Hour.syn
12/07/2017

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	0	11	13	15	8	0
Future Volume (vph)	0	11	13	15	8	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.928				
Flt Protected					0.950	
Satd. Flow (prot)	0	1921	1631	0	1825	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1921	1631	0	1825	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		247.0	147.1		197.6	
Travel Time (s)		17.8	10.6		14.2	
Confl. Peds. (#/hr)	5			5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%
Adj. Flow (vph)	0	12	14	16	9	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	12	30	0	9	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		24		14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	15.2%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
2: Strathearne Place & Marion Street

2022 Background PM Peak Hour.syn
12/07/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	0	11	13	15	8	0
Future Volume (Veh/h)	0	11	13	15	8	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	12	14	16	9	0
Pedestrians		1			5	
Lane Width (m)		3.7			3.7	
Walking Speed (m/s)		1.1			1.1	
Percent Blockage		0			0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	35				39	28
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	35				39	28
IC, single (s)	4.1				6.4	6.2
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1582				973	1047

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	12	30	9
Volume Left	0	0	9
Volume Right	0	16	0
cSH	1582	1700	973
Volume to Capacity	0.00	0.02	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.0	0.0	8.7
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.7
Approach LOS			A

Intersection Summary

Average Delay		1.5	
Intersection Capacity Utilization	15.2%		ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
3: Homestead Drive & Strathearne Place

2022 Background PM Peak Hour.syn
12/07/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	16	0	5	0	0	0	5	108	0	0	251	24
Future Volume (vph)	16	0	5	0	0	0	5	108	0	0	251	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.969									0.988	
Flt Protected		0.963						0.998				
Satd. Flow (prot)	0	1793	0	0	1921	0	0	1881	0	0	1847	0
Flt Permitted		0.963						0.998				
Satd. Flow (perm)	0	1793	0	0	1921	0	0	1881	0	0	1847	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		147.1			34.4			95.3			383.1	
Travel Time (s)		10.6			2.5			6.9			27.6	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Adj. Flow (vph)	17	0	5	0	0	0	5	117	0	0	273	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	0	0	0	122	0	0	299	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24			14	24			14	24
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	24.7% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
3: Homestead Drive & Strathearne Place

2022 Background PM Peak Hour.syn
12/07/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	16	0	5	0	0	0	5	108	0	0	251	24
Future Volume (vph)	16	0	5	0	0	0	5	108	0	0	251	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	0	5	0	0	0	5	117	0	0	273	26
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	22	0	122	299								
Volume Left (vph)	17	0	5	0								
Volume Right (vph)	5	0	0	26								
Hadj (s)	0.02	0.00	0.04	-0.01								
Departure Headway (s)	4.8	4.8	4.3	4.1								
Degree Utilization, x	0.03	0.00	0.15	0.34								
Capacity (veh/h)	680	684	818	874								
Control Delay (s)	8.0	7.8	8.0	9.1								
Approach Delay (s)	8.0	0.0	8.0	9.1								
Approach LOS	A	A	A	A								

Intersection Summary	
Delay	8.8
Level of Service	A
Intersection Capacity Utilization	24.7% ICU Level of Service A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: Marion Street & Airport Road

2022 Total AM Peak Hour.syn
12/11/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (vph)	349	21	27	414	63	64
Future Volume (vph)	349	21	27	414	63	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.992			0.997	0.976	
Flt Protected				0.997	0.976	
Satd. Flow (prot)	1825	0	0	1829	1633	0
Flt Permitted				0.997	0.976	
Satd. Flow (perm)	1825	0	0	1829	1633	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	242.7			264.6	98.7	
Travel Time (s)	17.5			19.1	7.1	
Confl. Peds. (#/hr)		8	8		3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	11%	0%	5%	6%	8%
Adj. Flow (vph)	379	23	29	450	68	70
Shared Lane Traffic (%)						
Lane Group Flow (vph)	402	0	0	479	138	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	58.0%
Analysis Period (min)	15
	ICU Level of Service B

HCM Unsignalized Intersection Capacity Analysis
1: Marion Street & Airport Road

2022 Total AM Peak Hour.syn
12/11/2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	349	21	27	414	63	64
Future Volume (Veh/h)	349	21	27	414	63	64
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	379	23	29	450	68	70
Pedestrians	3				8	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			410		910	398
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			410		910	398
IC, single (s)			4.1		6.5	6.3
IC, 2 stage (s)						
IF (s)			2.2		3.6	3.4
p0 queue free %			97		77	89
cM capacity (veh/h)			1151		289	633

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	402	479	138
Volume Left	0	29	68
Volume Right	23	0	70
cSH	1700	1151	399
Volume to Capacity	0.24	0.03	0.35
Queue Length 95th (m)	0.0	0.6	11.5
Control Delay (s)	0.0	0.8	18.7
Lane LOS	A	C	C
Approach Delay (s)	0.0	0.8	18.7
Approach LOS		C	

Intersection Summary	
Average Delay	2.9
Intersection Capacity Utilization	58.0%
Analysis Period (min)	15
	ICU Level of Service B

Lanes, Volumes, Timings
2: Strathearne Place & Marion Street

2022 Total AM Peak Hour.syn
12/11/2017

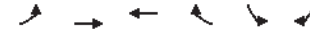


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	9	4	5	14	24	0
Future Volume (vph)	9	4	5	14	24	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.899					
Flt Protected	0.966				0.950	
Satd. Flow (prot)	0	1856	1645	0	1825	0
Flt Permitted	0.966				0.950	
Satd. Flow (perm)	0	1856	1645	0	1825	0
Link Speed (k/h)	50		50		50	
Link Distance (m)	247.0		147.1		197.6	
Travel Time (s)	17.8		10.6		14.2	
Confl. Peds. (#/hr)	5			5	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%
Adj. Flow (vph)	10	4	5	15	26	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	14	20	0	26	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	0.0		0.0		3.7	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.9		4.9		4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14		24	
Sign Control	Free		Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	17.7% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Strathearne Place & Marion Street

2022 Total AM Peak Hour.syn
12/11/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	9	4	5	14	24	0
Future Volume (Veh/h)	9	4	5	14	24	0
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	4	5	15	26	0
Pedestrians	1				5	
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	0			0		
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	25				42 18	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	25				42 18	
IC, single (s)	4.1				6.4 6.2	
IC, 2 stage (s)						
IF (s)	2.2				3.5 3.3	
p0 queue free %	99				97 100	
cM capacity (veh/h)	1595				964 1059	

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	14	20	26
Volume Left	10	0	26
Volume Right	0	15	0
cSH	1595	1700	964
Volume to Capacity	0.01	0.01	0.03
Queue Length 95th (m)	0.1	0.0	0.6
Control Delay (s)	5.2	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	5.2	0.0	8.8
Approach LOS			A

Intersection Summary	
Average Delay	5.0
Intersection Capacity Utilization	17.7% ICU Level of Service A
Analysis Period (min)	15

Lanes, Volumes, Timings
3: Homestead Drive & Strathearne Place

2022 Total AM Peak Hour.syn
12/11/2017

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	8	0	18	0	0	0	15	156	0	0	57	6
Future Volume (vph)	8	0	18	0	0	0	15	156	0	0	57	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.907									0.986	
Flt Protected		0.985						0.996				
Satd. Flow (prot)	0	1716	0	0	1921	0	0	1785	0	0	1669	0
Flt Permitted		0.985						0.996				
Satd. Flow (perm)	0	1716	0	0	1921	0	0	1785	0	0	1669	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		147.1			34.4			95.3			383.1	
Travel Time (s)		10.6			2.5			6.9			27.6	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	20%	6%	0%	0%	15%	0%
Adj. Flow (vph)	9	0	20	0	0	0	16	170	0	0	62	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	29	0	0	0	0	0	186	0	0	69	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	25.7% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
3: Homestead Drive & Strathearne Place

2022 Total AM Peak Hour.syn
12/11/2017

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	0	18	0	0	0	15	156	0	0	57	6
Future Volume (vph)	8	0	18	0	0	0	15	156	0	0	57	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	20	0	0	0	16	170	0	0	62	7
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	29	0	186	69								
Volume Left (vph)	9	0	16	0								
Volume Right (vph)	20	0	0	7								
Hadj (s)	-0.35	0.00	0.14	0.17								
Departure Headway (s)	4.1	4.5	4.2	4.3								
Degree Utilization, x	0.03	0.00	0.22	0.08								
Capacity (veh/h)	822	765	846	819								
Control Delay (s)	7.2	7.5	8.3	7.7								
Approach Delay (s)	7.2	0.0	8.3	7.7								
Approach LOS	A	A	A	A								

Intersection Summary	
Delay	8.1
Level of Service	A
Intersection Capacity Utilization	25.7% ICU Level of Service A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: Marion Street & Airport Road

2022 Total PM Peak Hour.syn
12/11/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↘	↖	↗
Traffic Volume (vph)	411	51	62	295	43	37
Future Volume (vph)	411	51	62	295	43	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.985				0.938	
Flt Protected				0.991	0.974	
Satd. Flow (prot)	1859	0	0	1804	1755	0
Flt Permitted				0.991	0.974	
Satd. Flow (perm)	1859	0	0	1804	1755	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	242.7			264.6	98.7	
Travel Time (s)	17.5			19.1	7.1	
Confl. Peds. (#/hr)		11	11			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	8%	5%	0%	0%
Adj. Flow (vph)	447	55	67	321	47	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	502	0	0	388	87	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	58.5%
Analysis Period (min)	15
	ICU Level of Service B

HCM Unsignalized Intersection Capacity Analysis
1: Marion Street & Airport Road

2022 Total PM Peak Hour.syn
12/11/2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↘	↖	↗
Traffic Volume (veh/h)	411	51	62	295	43	37
Future Volume (Veh/h)	411	51	62	295	43	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	447	55	67	321	47	40
Pedestrians					11	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			513		940	486
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vC, unblocked vol			513		940	486
IC, single (s)			4.2		6.4	6.2
IC, 2 stage (s)						
IF (s)			2.3		3.5	3.3
p0 queue free %			93		83	93
cM capacity (veh/h)			1011		272	579


Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	502	388	87
Volume Left	0	67	47
Volume Right	55	0	40
cSH	1700	1011	360
Volume to Capacity	0.30	0.07	0.24
Queue Length 95th (m)	0.0	1.6	7.1
Control Delay (s)	0.0	2.1	18.2
Lane LOS	A	A	C
Approach Delay (s)	0.0	2.1	18.2
Approach LOS			C

Intersection Summary

Average Delay		2.5	
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: Strathearne Place & Marion Street

2022 Total PM Peak Hour.syn
12/11/2017




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	7	4	13	30	15	0
Future Volume (vph)	7	4	13	30	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.905				
Flt Protected		0.968			0.950	
Satd. Flow (prot)	0	1860	1641	0	1825	0
Flt Permitted		0.968			0.950	
Satd. Flow (perm)	0	1860	1641	0	1825	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		247.0	147.1		197.6	
Travel Time (s)		17.8	10.6		14.2	
Confl. Peds. (#/hr)	5			5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%
Adj. Flow (vph)	8	4	14	33	16	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	12	47	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	16.7% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Strathearne Place & Marion Street

2022 Total PM Peak Hour.syn
12/11/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	7	4	13	30	15	0
Future Volume (Veh/h)	7	4	13	30	15	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	4	14	33	16	0
Pedestrians		1			5	
Lane Width (m)		3.7			3.7	
Walking Speed (m/s)		1.1			1.1	
Percent Blockage		0			0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	52				56	36
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	52				56	36
IC, single (s)	4.1				6.4	6.2
IC, 2 stage (s)						
IF (s)	2.2				3.5	3.3
p0 queue free %	99				98	100
cM capacity (veh/h)	1559				948	1036

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	12	47	16
Volume Left	8	0	16
Volume Right	0	33	0
cSH	1559	1700	948
Volume to Capacity	0.01	0.03	0.02
Queue Length 95th (m)	0.1	0.0	0.4
Control Delay (s)	4.9	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	4.9	0.0	8.9
Approach LOS			A

Intersection Summary	
Average Delay	2.7
Intersection Capacity Utilization	16.7% ICU Level of Service A
Analysis Period (min)	15

Lanes, Volumes, Timings
3: Homestead Drive & Strathearne Place

2022 Total PM Peak Hour.syn
12/11/2017

	↖	→	↘	↙	←	↖	↙	↑	↘	↙	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	0	16	0	0	0	20	100	0	0	244	24
Future Volume (vph)	5	0	16	0	0	0	20	100	0	0	244	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.896									0.988	
Flt Protected		0.989						0.992				
Satd. Flow (prot)	0	1702	0	0	1921	0	0	1875	0	0	1848	0
Flt Permitted		0.989						0.992				
Satd. Flow (perm)	0	1702	0	0	1921	0	0	1875	0	0	1848	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		147.1			34.4			95.3			383.1	
Travel Time (s)		10.6			2.5			6.9			27.6	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Adj. Flow (vph)	5	0	17	0	0	0	22	109	0	0	265	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	0	0	131	0	0	291	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	32.4%
Analysis Period (min)	15
	ICU Level of Service A

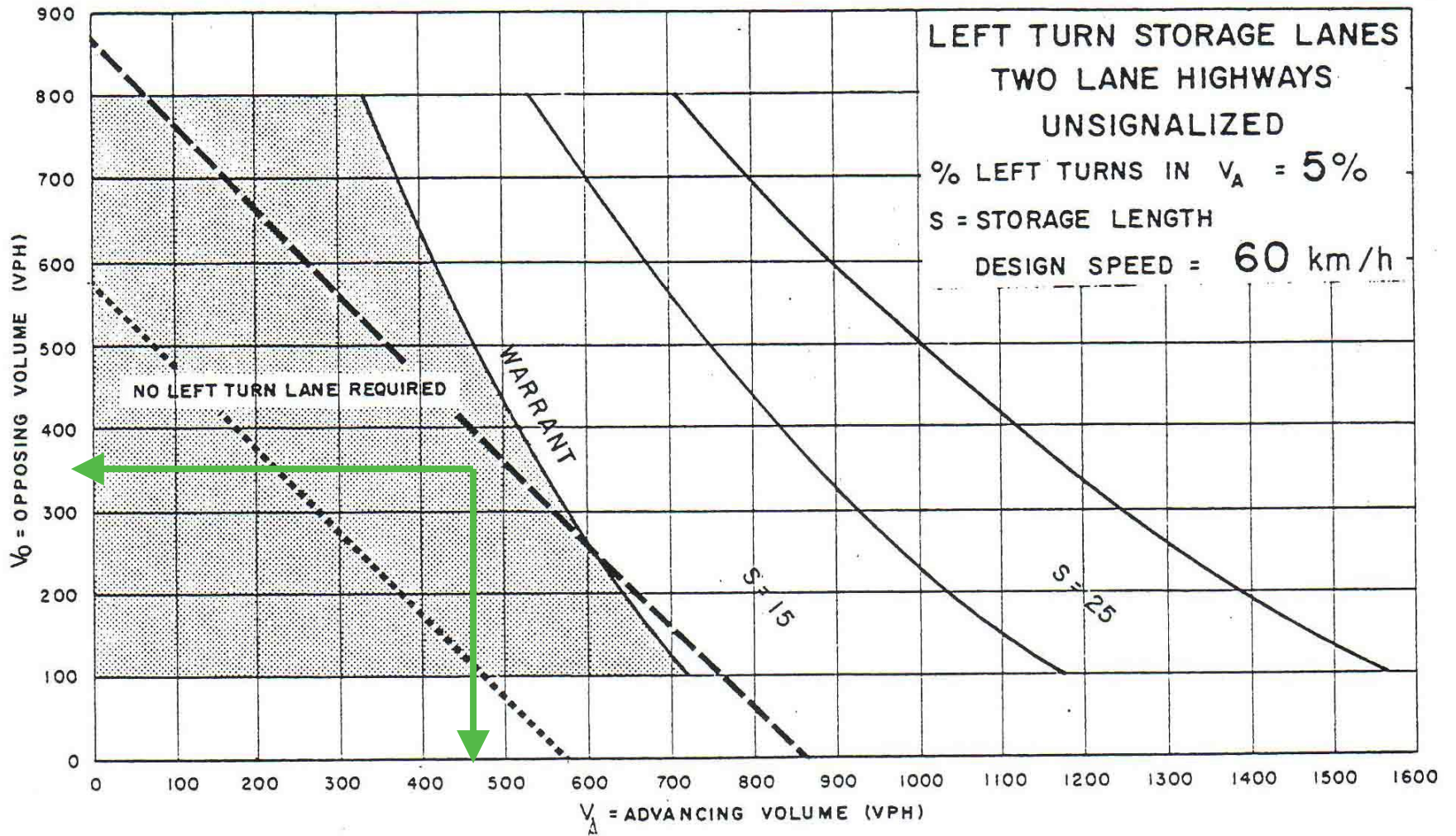
HCM Unsignalized Intersection Capacity Analysis
3: Homestead Drive & Strathearne Place

2022 Total PM Peak Hour.syn
12/11/2017

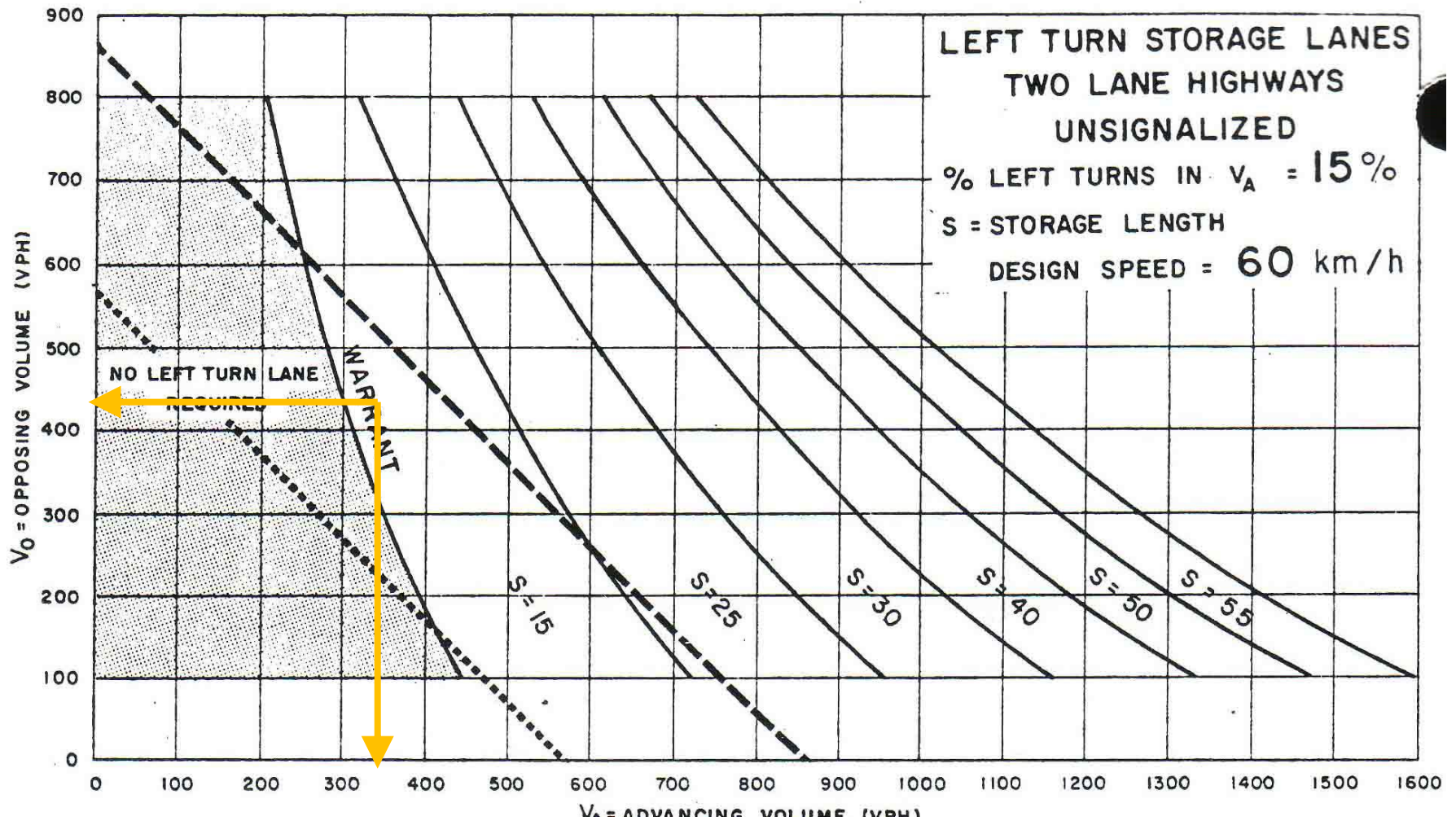
	↖	→	↘	↙	←	↖	↙	↑	↘	↙	↓	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	0	16	0	0	0	20	100	0	0	244	24
Future Volume (vph)	5	0	16	0	0	0	20	100	0	0	244	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	17	0	0	0	22	109	0	0	265	26
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	22	0	131	291								
Volume Left (vph)	5	0	22	0								
Volume Right (vph)	17	0	0	26								
Hadj (s)	-0.42	0.00	0.06	-0.01								
Departure Headway (s)	4.4	4.8	4.3	4.1								
Degree Utilization, x	0.03	0.00	0.16	0.33								
Capacity (veh/h)	741	684	817	873								
Control Delay (s)	7.5	7.8	8.1	9.1								
Approach Delay (s)	7.5	0.0	8.1	9.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				8.7								
Level of Service				A								
Intersection Capacity Utilization			32.4%		ICU Level of Service						A	
Analysis Period (min)			15									

APPENDIX D
LEFT TURN LANE NOMOGRAPHS

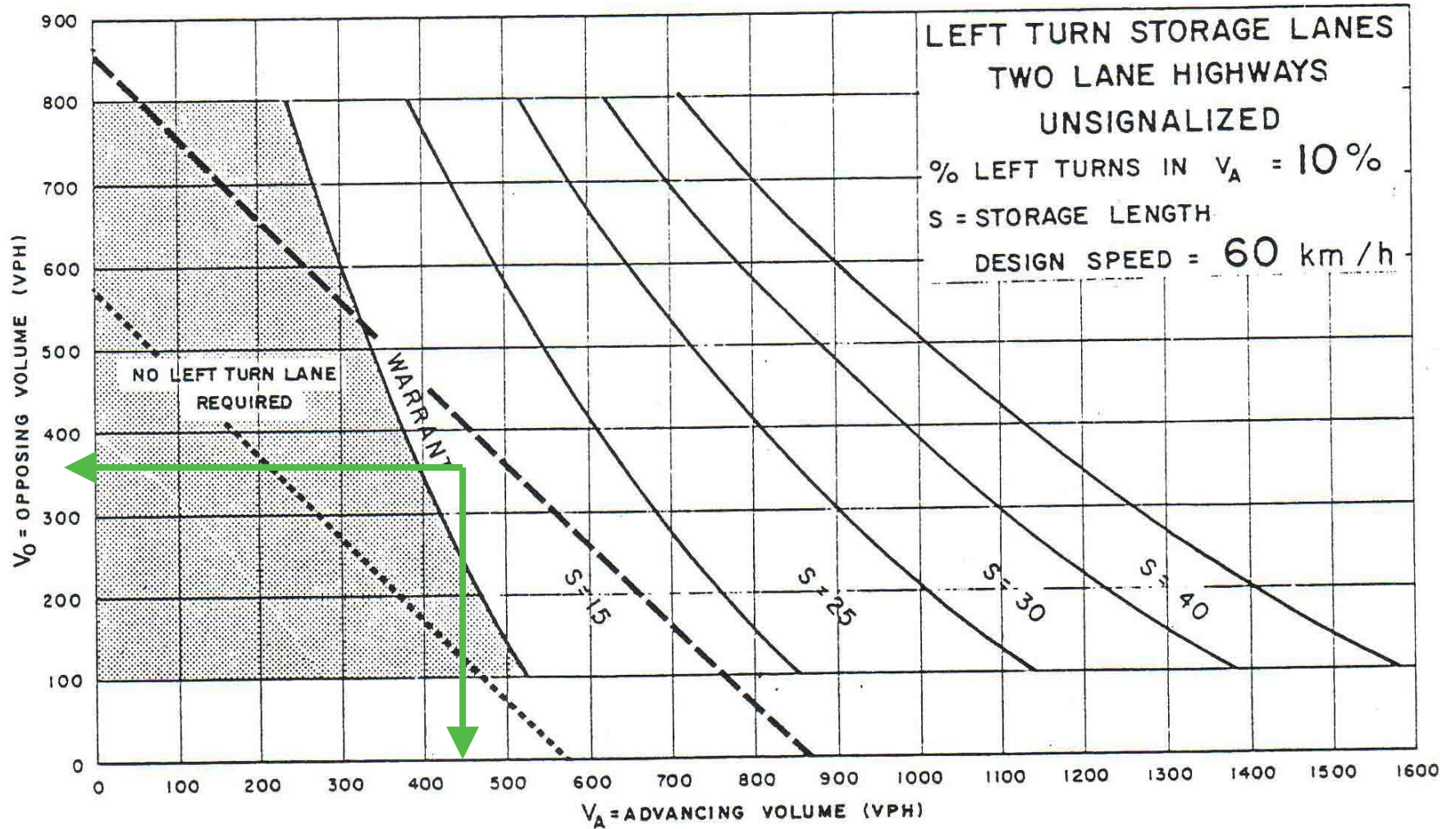




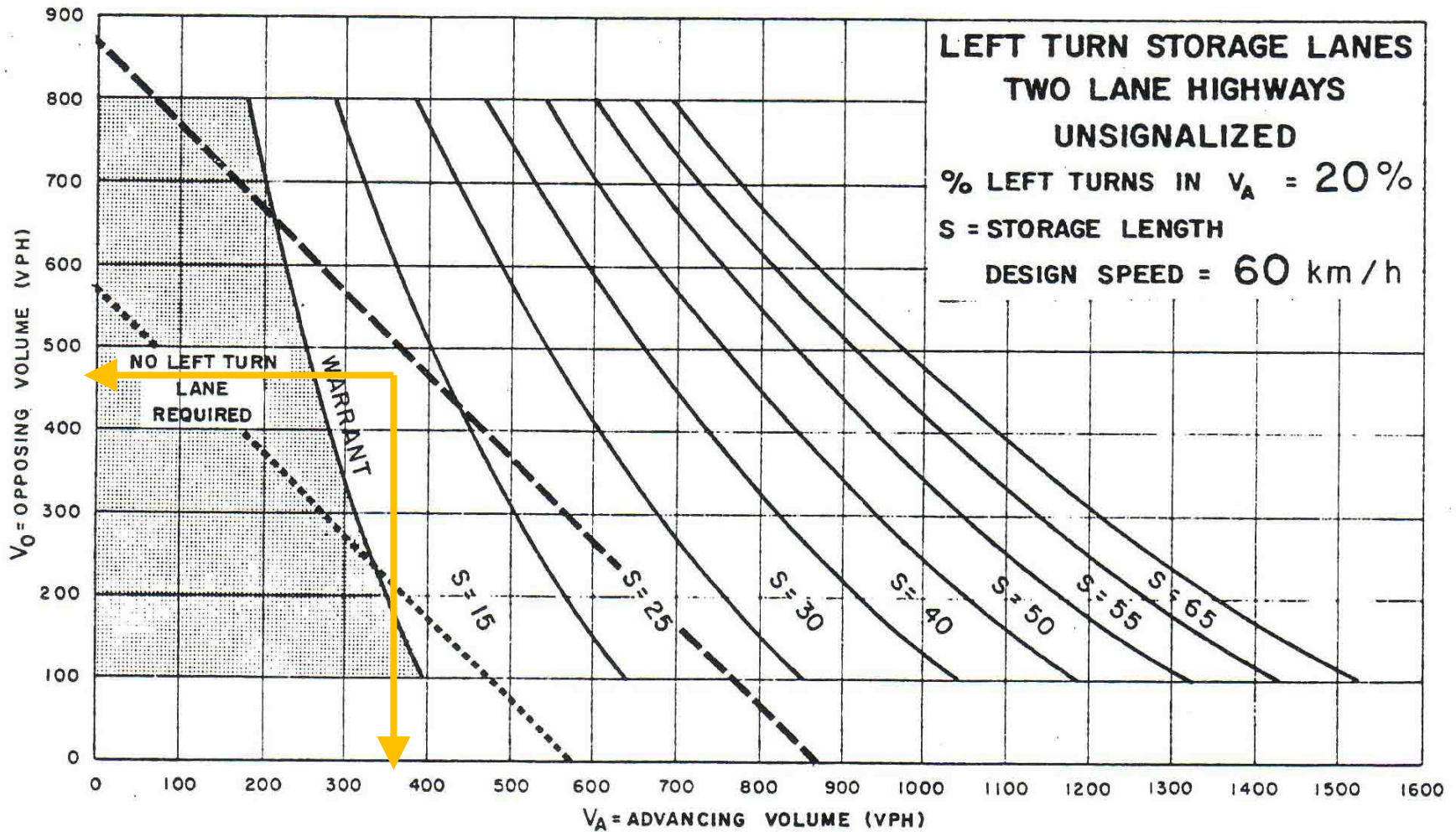
Airport Road at Marion Street- 2022 Background Westbound Left Turn Lane Warrant (AM Peak)



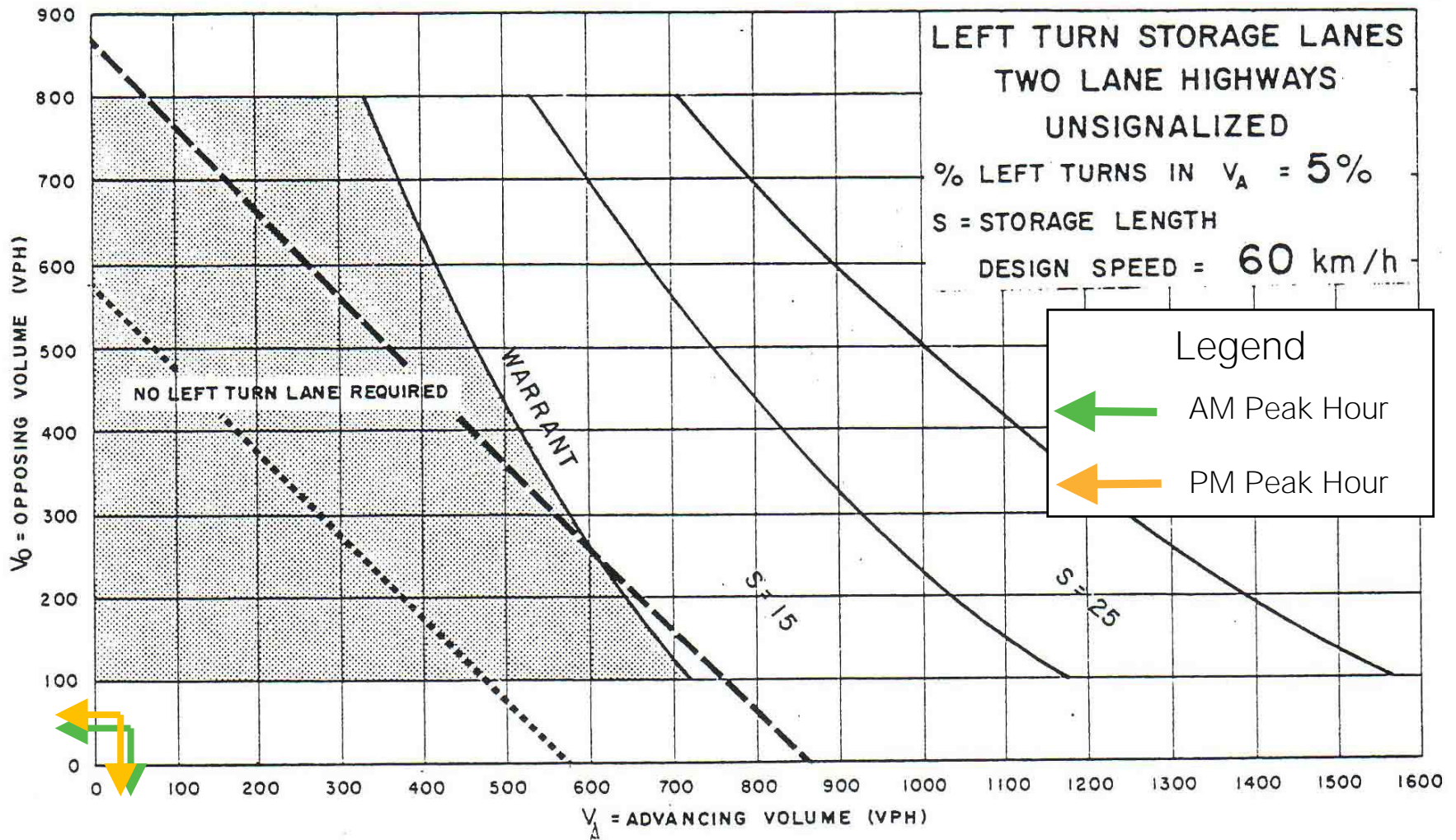
Airport Road at Marion Street - 2022 Background Westbound Left Turn Lane Warrant (PM Peak)



Airport Road at Marion Street- 2022 Total Westbound Left Turn Lane Warrant (AM Peak)



Airport Road at Marion Street- 2022 Total Westbound Left Turn Lane Warrant (PM Peak)



Strathearne Place at Marion Street- 2022 Total Eastbound Left Turn Lane Warrant (AM and PM Peak)